AMERICA'S LARGEST TEXTILE MONTHLY

COTTON

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FEBRUARY, 1923

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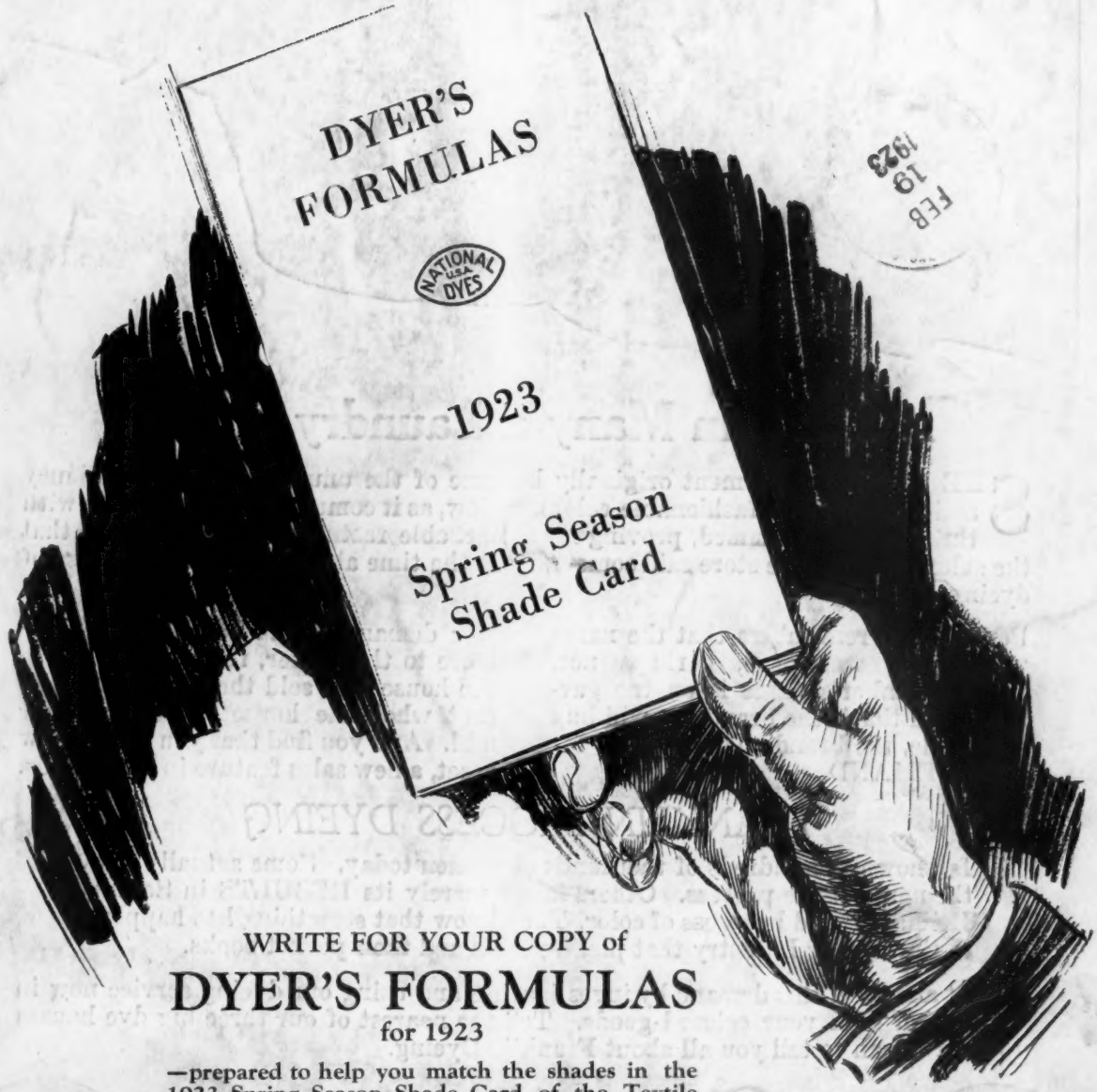


WRITE FOR YOUR COPY of

DYER'S FORMULAS

for 1923

—prepared to help you match the shades in the 1923 Spring Season Shade Card of the Textile Color Card Association.

Let us send you this booklet. Now ready.

NATIONAL ANILINE & CHEMICAL CO. INC.
40 Rector St., New York City

It Starts in Many a Laundry Basket

SHE bought the garment originally because of the unusual solidity, brilliancy and beauty of its fashionable colors. Now, as it comes from the Laundry with those colors undimmed, proving its remarkable fastness, she remembers that the saleswoman in the store said something at the time about a patented process of dyeing.

Perhaps she remembers that the name "Franklin" was used, perhaps not. But the maker's name is on the garment, and that's the brand she will buy next time, the brand she will go so far as to DEMAND.

Her demand works back through the store to the maker, from the maker to the house that sold the cloth, and from that wholesale house right into your mill. And you find that you have a new asset, a new sales feature in your goods.

FRANKLIN PROCESS DYEING

Is known to hundreds of thousands of women today. Some actually know the name of the process. Others know merely its RESULTS in Solidity, Brilliancy, and Fastness of color. They know that something has happened to the Dyeing Industry that pleases them and their pocket books.

Go out and meet this demand by investigating and using our dyeing service now in connection with your colored goods. Tell the nearest of our three big dye houses to send a man to tell you all about Franklin Dyeing.

FRANKLIN PROCESS CO.

Philadelphia PROVIDENCE Manchester, Eng.

New York Office, 72 Leonard Street

SOUTHERN FRANKLIN PROCESS CO.

Greenville, S. C.

WOULD YOU HESITATE TO SPEND $100,000

for Modern Machinery for your Mill if you could be shown that the *Annual Return* on the investment would be

24% PROFIT

That is exactly what a Mill Owner found he could do in a recent investigation made by his own manufacturing executives in co-operation with our experts. Only actual facts were used—not theories.

EXPERIENCE PROVES THE FACTS

This is not an isolated or unusual case. Investigations of actual results obtained over a period of years by mills that had both Common and Northrop Looms running in the same or adjoining Weave Rooms have shown even greater savings.

INCREASE THE PRODUCT PER MACHINE AND PER WORKER

and American Industry is safe—for the Manufacturer and for the Worker. To stick to old methods and old machines because they have sufficed until now is to endanger your prosperity. The load 20th Century business and industry carries under present conditions is too heavy for the old bridge that was once safe enough. Everywhere new bridges replace the old. To delay rebuilding is dangerous. *Oxen have gone; the Horse is going; the Automobile is here. The Hand Loom has gone; the Common Power Loom is going; the Automatic Loom is here.*

LET'S TALK IT OVER

Our Salesmen and Experts are at your call. Draper Service may be had for the asking without obligations. You have been wondering if it wasn't time to begin scrapping some of the old machinery. Let's talk it over.

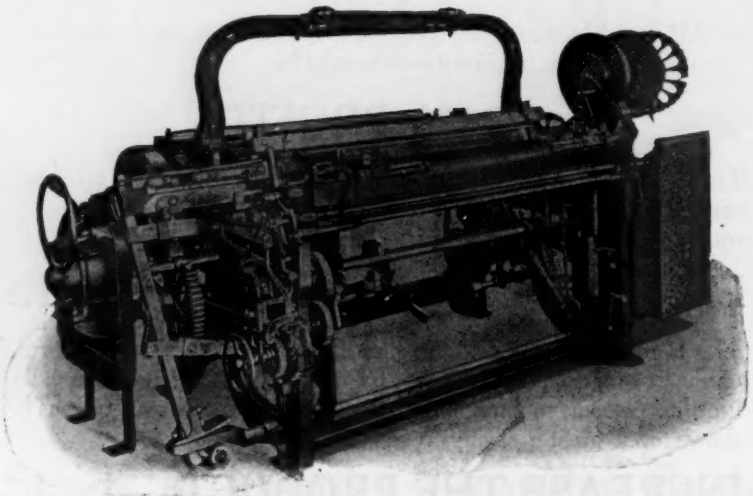
DRAPER CORPORATION

HOPEDALE MASSACHUSETTS

SOUTHERN OFFICE—ATLANTA GEORGIA

Copyright 1917 by Draper Corporation

STAFFORD
AUTOMATIC LOOMS



Stafford automatic bobbin-changing loom with high take-up roll

A Better Face On Your Goods With Staffords

Stafford Looms are not an expense, but the best investment in looms that can be secured. They not only increase production but they put a better face on the goods than any other loom on the market, a fact conceded by many.

The Stafford Loom has a mechanical warp stop motion which is operated at the side of the loom and is acknowledged one of the best motions for simplicity and accessibility. It puts less strain on the warp yarn.

Stafford Looms are built with either shuttle or bobbin changing automatic features to meet practically every weaving requirement.

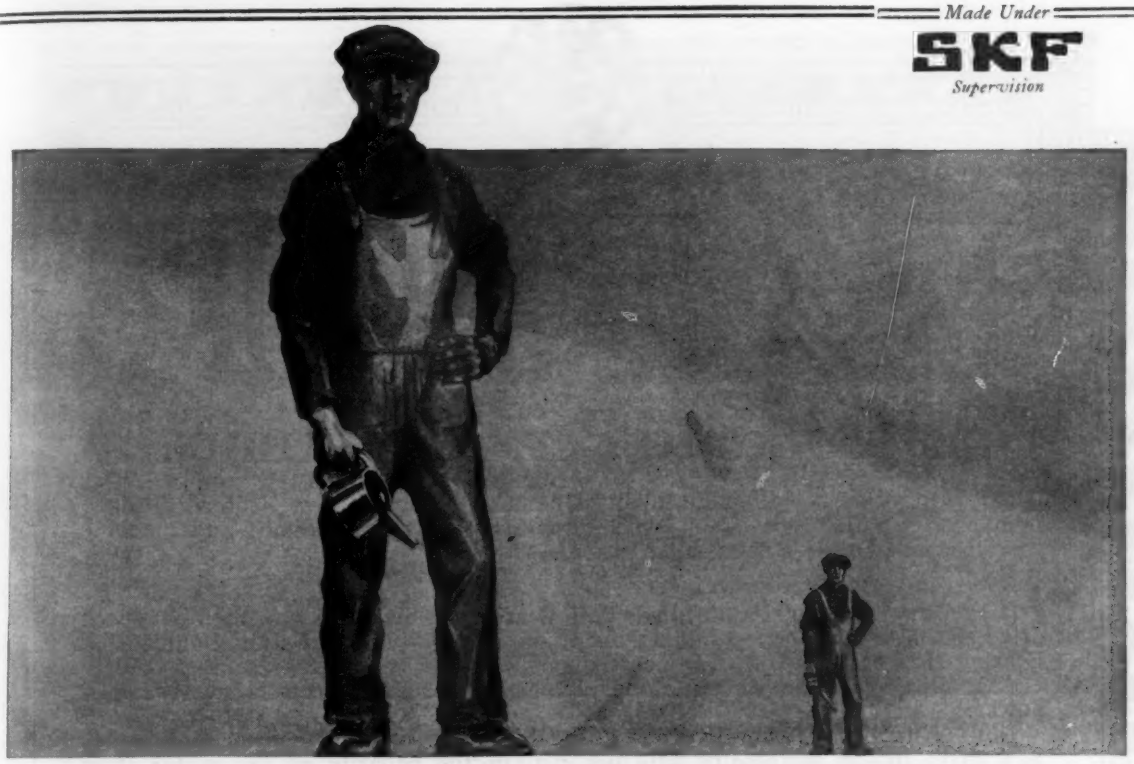
THE STAFFORD COMPANY

Weaving Machinery

READVILLE, MASS.

Southern Agent—J. H. MAYES, Charlotte, N. C.
Branch Office—502 Colt Bldg., Paterson, N. J.
Canadian Representatives—
Whitehead, Emmans, Ltd., Montreal, Quebec.

Made Under
SKF
Supervision



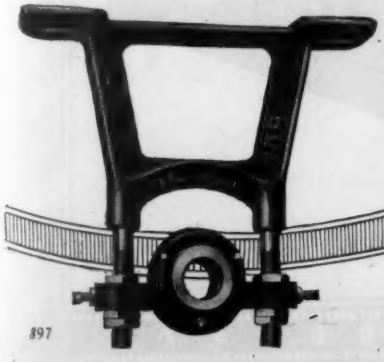
Transmission Maintenance Reduced
From 100 to 8 Man-Hours

A PLANT which changed over from plain-bearing line-shaft equipment to Skayef self-aligning ball-bearing hangers found that the number of man-hours required per year for lubricating the bearings was reduced from 100 to 8. As 40c. per hour was the rate at which the oiler was paid, the cost of lubricating the bearings was reduced from $40.00 to $3.20 a year or by $36.80. So little time was required for lubricating the bearings that it could be done in an idle period.

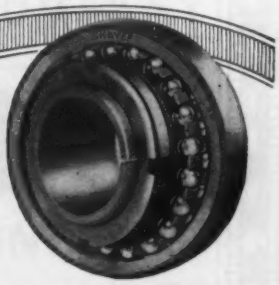
The overhead charges for maintenance of self-aligning ball-bearing hangers as compared with babbitt bearing equipment was so low as to be practically negligible. Furthermore, there were no expensive shut downs for bearing adjustments and replacements and a substantial saving was effected in power consumption. Totalled, these savings were $932.05 annually, or a return of 54.3 per cent on the investment of $1715.20. The equipment paid for itself in one year and 10 months, after which time there was a clear saving of $932.05 per year.

Can you afford to put off having our engineers make definite recommendations for bringing savings such as these to your plant.

Stock-Carrying Agents in All Principal Cities.



SKAYEF
Self-Aligning
Ball Bearing
HANGERS
(IMPROVED TYPE)



897

THE SKAYEF BALL BEARING COMPANY
165 Broadway New York City

FAFNIR

One Hundred Per Cent Annually

This is the startling return on the investment made by the New Bedford Cordage Company, New Bedford, Mass., when they replaced their lineshaft and machine bearings with **Fafnir Ball Bearing Boxes.**

Here are some interesting facts:—

(1.) They have 1000 **Fafnir Single Ball Bearing Pillow Blocks** on the high speed drive shafts of their rope spinning machines, in addition to **Fafnir Double Ball Bearing Hanger Boxes** on their line shafting.

(2.) Power consumption per machine has been reduced from 2.4 to 1.4 horsepower.

(3.) Where they formerly drove 12 machines with a 25 horsepower motor, they now drive 16—an increase of 33⅓ per cent in the capacity of the motor since equipping line shafting and machines with **Fafnir Ball Bearing Boxes.**

(4.) Saving in power, oil and maintenance pay for the **Fafnir Ball Bearing Boxes** in one year.

(5.) Results of power tests made with an Esterline Graphic Wattmeter are printed in the November, 1922, number of "The Dragon," our monthly magazine. A copy will be sent you on request.

Fafnir Ball Bearings are made in all standard types and sizes, and all are manufactured with the utmost accuracy and finish from thoroughly heat treated (not case hardened) chrome alloy steel.

The Fafnir Bearing Company

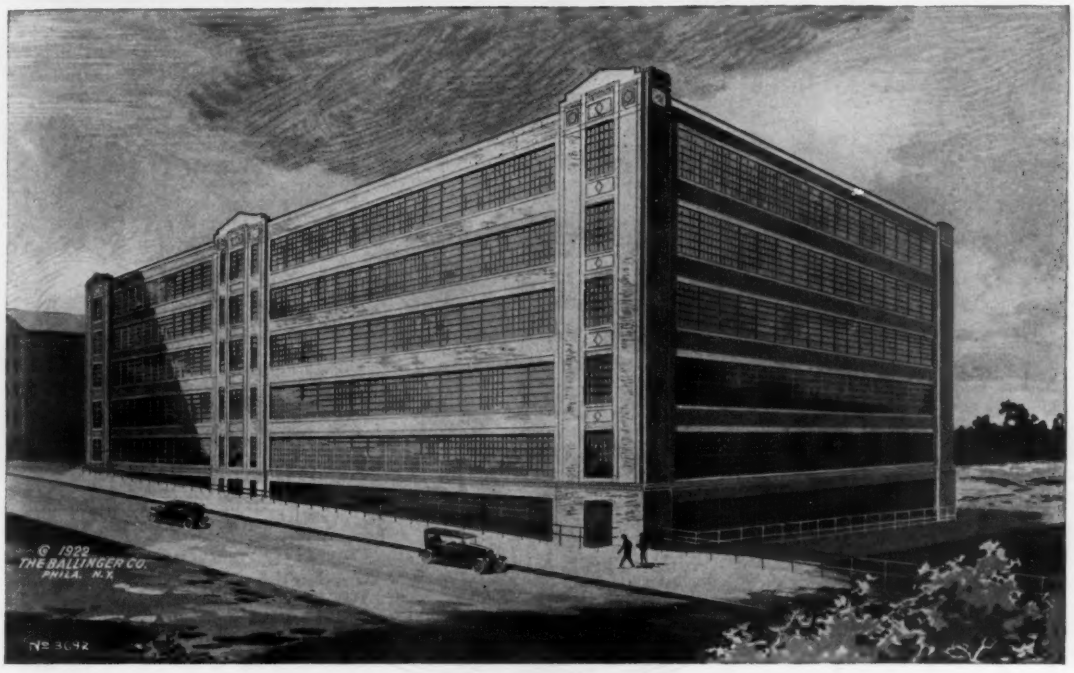
Conrad Patent Licensee

New Britain, Conn.

Southern Representatives

O. B. S. Pool
Box 1375
Greenville, S. C.

S. M. Smith
P. O. Box 1423
Greensboro, N. C.



Worsted Yarn Factory, James Lees & Sons Co., Bridgeport, Pa.
Architects & Engineers—The Ballinger Co.

Building With Daylight

Daylight was such an important element in this Worsted Yarn Mill that the exterior columns were omitted to permit an unbroken line of steel windows.

This is the latest step in daylighting textile buildings designed by The Ballinger Company, New York and Philadelphia.

34,500 sq. ft. of Truscon Steel Windows were furnished for this building—Truscon engineers are usually consulted on big problems of natural ventilation and daylighting.

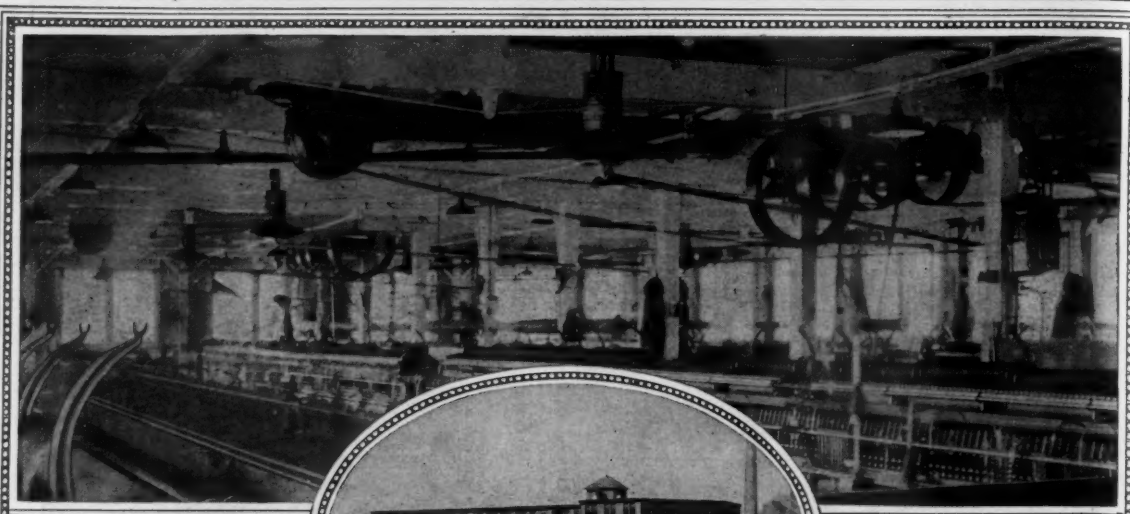
Truscon engineers are at your service at all times to help you make your building a complete success. Back of them is an organization completely equipped to meet every building requirement.

There are types and designs of Truscon Steel Windows and mechanical operators for every type of building, from the plain factory to the highest class of school or office building.

TRUSCON STEEL COMPANY
YOUNGSTOWN OHIO

Warehouses and Sales Offices in Principal Cities

TRUSCON STEEL WINDOWS



H. H. Wood & Company
Lakeport, N. H.
Chas. G. St. Clair, Treas.

Wool Hosiery of All Kinds
15 Sets Woolen
175 Latch Needle Knitting

ParkSpray Humidifiers in Woolen Manufacture
Carding Mule Spinning Knitting

Humidifiers in Knitting Room

In this plant wool is carded, spun and knit. The Product is wool hosiery. ParkSpray humidifiers (with automatic regulators) have been installed in all these departments.

> "We are much pleased to advise you that the humidifier system which you installed is giving perfect satisfaction. It is a great benefit to us, and *worth much more than the price of installation.*"

IT HAS BEEN DONE. It is being done. ParkSpray Humidifiers help to solve problems in the carding and spinning of wool—not to mention the knitting of it.

Parks-Cramer Company
Engineers & Contractors
Industrial Piping and Air Conditioning
Fitchburg Boston Charlotte

When Moral Hazard Stalks in Cotton States

Another "Amazing Chart" that Calls for Explanation

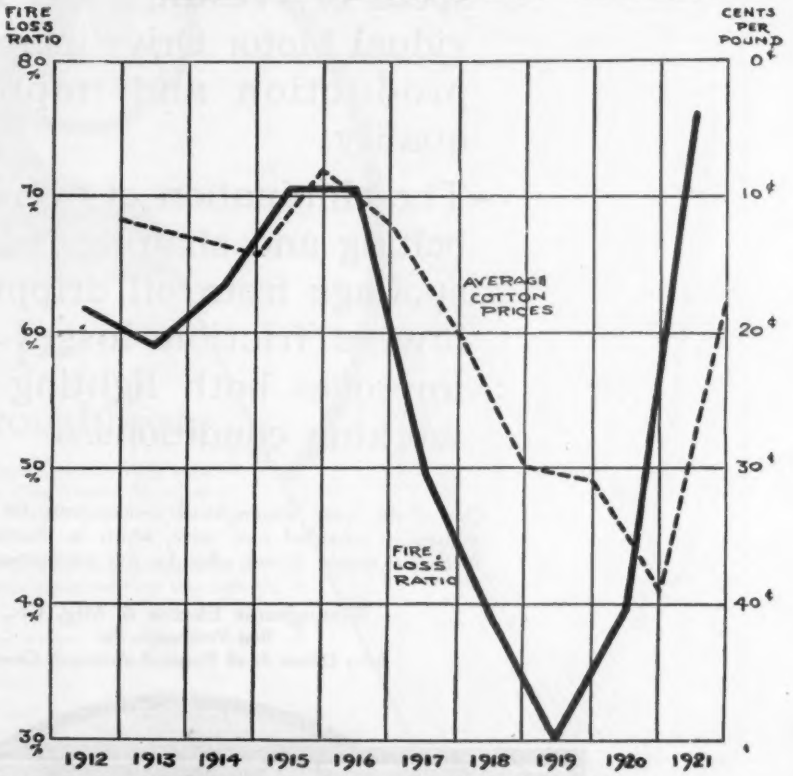
HERE is a Chart that will interest cotton men and cotton underwriters, also bankers, credit men and many others. It makes no accusations, expresses no opinions, but merely presents facts drawn from reliable sources by a well-known authority, Mr. R. H. Colcock, Jr., of New Orleans, Assistant Manager of the Southern Department of the Liverpool & London & Globe Insurance Company.

These facts speak for themselves. The Chart is well worth study. It shows the strange relationship that appears to exist between the price of cotton and the fire loss ratio on all kinds of property in the cotton-growing states: Alabama, Florida, Georgia, Louisiana, Mississippi, Oklahoma, Texas, Tennessee, North Carolina and South Carolina.

The *dotted line* follows nine years' fluctuations in the price of this great staple; for purposes of comparison it is shown in the Chart in reverse. Thus it appears to have started from a low point in 1912, to have risen slightly in the next two years, then to have declined sharply when the war upset general business, reaching its lowest point in 1916. From this point the progress was rapid and nearly uniform for three years, slackened somewhat during 1919, then swiftly increased to its peak in 1920, from which point it dropped so rapidly that in one year it lost more than had been gained in the preceding three. So much for the dotted line.

Now note the *black line*, which represents the *fire loss ratio* on all kinds of property in these states. Its movements are of extraordinary interest. It fell slightly during the first year, which is to say that the values destroyed by fire were smaller; then it began to rise with great speed for the next two years. Hereafter appears a singular phenomenon. During 1914, although the average price of cotton was rising, the loss ratio also was rising. This was the beginning of the Great War with its attendant uncertainty.

The black line (loss ratio) is seen to have held level for about a year and then to have declined with an almost vertical drop to 1919. The general fire loss ratio thus decreased by more than half and, by a strange coincidence, cotton prices increased from ten to more than thirty cents a pound, or some 200%, during this same period. Was the price of cotton making everybody prosperous and largely eliminating the Moral Hazard? The Chart inspires the question.



Fire Insurance Loss Ratio and Average Cotton Prices
(*In Cotton-Producing States*) (*Based on New Orleans Middling*)

However, the most remarkable feature of the whole showing is that of the period during 1919 and 1920, when, suddenly and without warning, the loss ratio was nearly doubled and yet the price of cotton had not yet touched its highest point of nearly forty cents a pound. One is tempted to inquire whether it could have been anticipated that within twelve months thereafter cotton prices would drop more than 50%. Whether or not this indicates pre-vision, the coincidence is remarkable and commends itself to study. We trust that this study will be made both inside and outside of the cotton trade, *most of whose members are and will remain free from the slightest taint of suspicion.*

No one can question that this Chart calls for discussion. The Glens Falls Insurance Company carries much cotton insurance and will welcome comment.

Glens Falls
INSURANCE COMPANY
GLENS FALLS, NEW YORK

E. W. WEST, President H. N. DICKINSON, Vice-President F. M. SMALLEY, Secretary R. C. CARTER, Treasurer J. A. MAVON, F. L. COWLES, H. W. KNIGHT, Assistant Secretaries

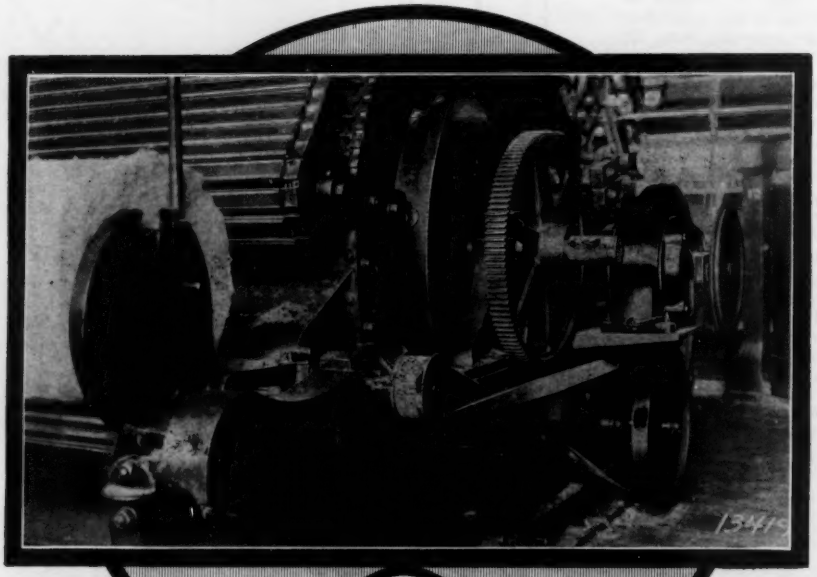
Both new and old textile mills are installing Westinghouse Individual Motor Drive, because—

—The maximum, constant speed of Westinghouse Individual Motor Drive increases production and improves quality.

—The elimination of overhead belting and shafting reduces spoilage from oil drippings, lowers friction losses and improves both lighting and working conditions.

One of the latest Westinghouse developments for the textile industry is individual card drive, which is illustrated below. Write our nearest district office for full information.

Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.
Sales Offices in all Principal American Cities.



Westinghouse

Westinghouse

BOTH--

are Thoroughbreds

Like the fine entries shown in this night view of the recent Kansas City Horse Show, the Westinghouse-Cutter Holder-Socket Reflector is a THOROUGHBRED

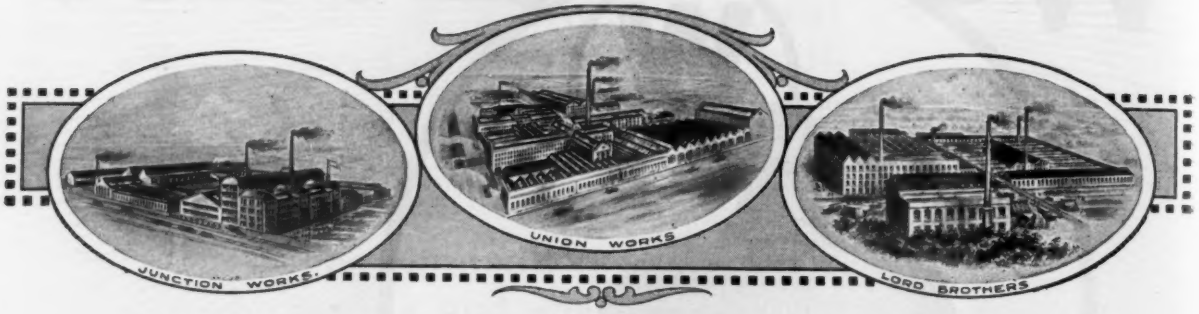
Only the years of patient, scientific selection of the fine points of illumination could develop this lighting unit.

Observe the even intensity of illumination here afforded by the Westinghouse-Cutter Reflectors used with Westinghouse Mazda Lamps.

Westinghouse has facts and figures that will enable you to meet your lighting requirements. Take advantage of the Free Advisory Service offered through the Westinghouse Illumination Engineering Bureau. Write to the address below.

Westinghouse Electric & Manufacturing Company
George Cutter Works, South Bend, Indiana

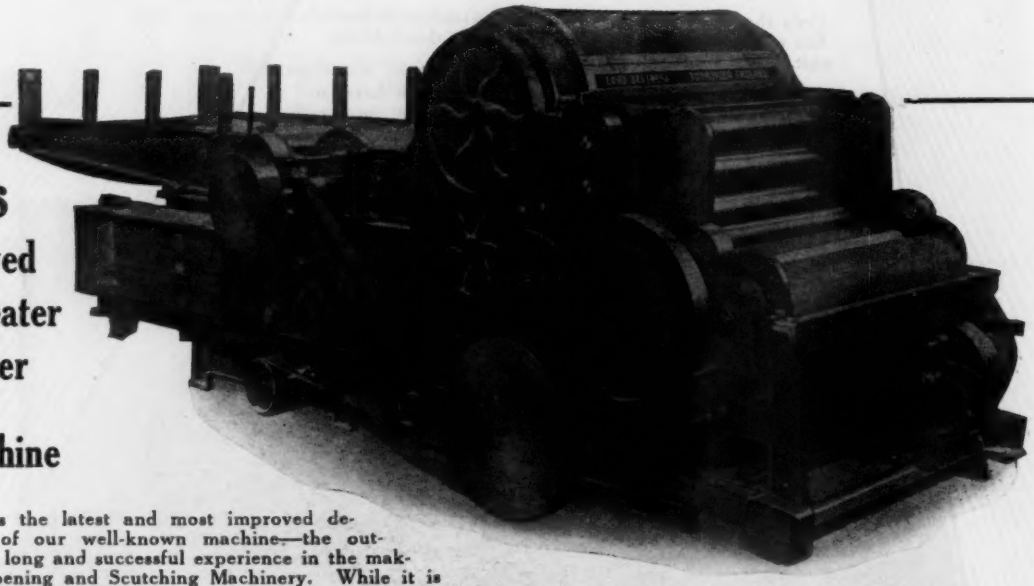
LORD BROTHERS



TEXTILE MACHINERY MAKERS

Waste Spinning Machinery a Specialty

Bale Openers for high-density and other Cotton Bales, Lattice Work, Hopper Feeders, Openers of various descriptions, and Scutchers for the treatment of Cotton and Cotton Waste.



Lord's Improved Single Beater Scutcher and Lap Machine

THIS is the latest and most improved design of our well-known machine,—the outcome of a long and successful experience in the making of Opening and Scutching Machinery. While it is the lightest running Scutcher on the market, it is very strongly made and capable of the best possible Opening, Cleaning and Regulating. We can specially adapt this Scutcher for Waste when required. It is made with Single Feed Roller and pedals (which give the best results) with pedal noses of various degrees of roundness to suit different staples of Cotton. Extra Feed Rollers may be added if desired.

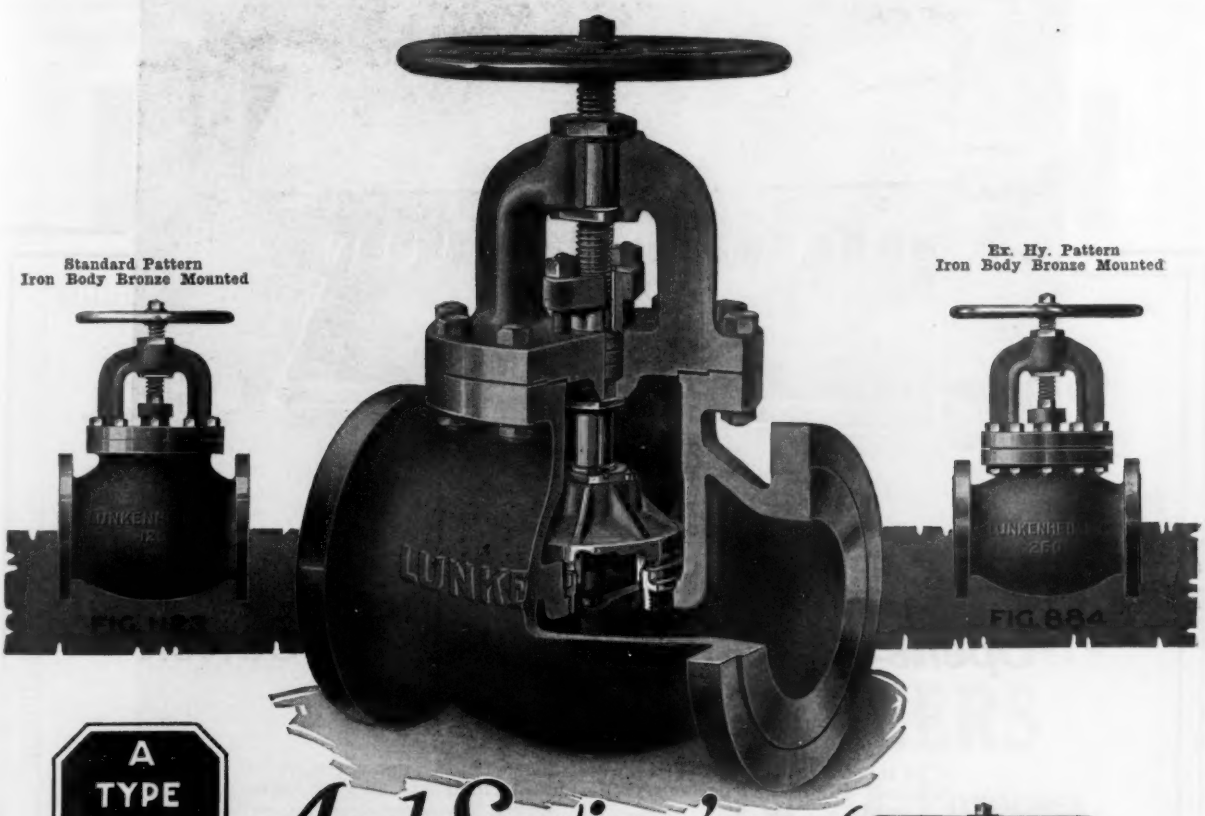
Write for Descriptive Leaflet.

Manufacturers of Denims, Dungarees, Ticks and Regattas

CABLES:—"LORD'S Todmorden, Eng." CODES:—A.B.C. 5th, Bentley's: Lieber's A-1, and Western Union (Universal)

CANAL STREET WORKS, TODMORDEN, ENG.

INCORPORATED IN BROOKS & DOXEY (1920) LTD.



A TYPE FOR EVERY PURPOSE

And Service 'way beyond the average!

FIG. 606
CAST STEEL

Be it a small or large size for low or high pressures and temperatures, there is a Lunkenheimer Valve especially suited to the purpose. Every type is designed to give maximum service under extreme operating conditions, and with the line complete, standardization throughout the plant with its many advantages, is easily accomplished.

With seating surfaces regrindable and all parts made to gauge and renewable, the installation of Lunkenheimer Valves means permanence in the line with a minimum expense for maintenance and repairs.

Our catalog No. 58-AK illustrates and describes the various types in detail. A copy will be sent on request. If you have a valve problem, we will help you,—no obligation.

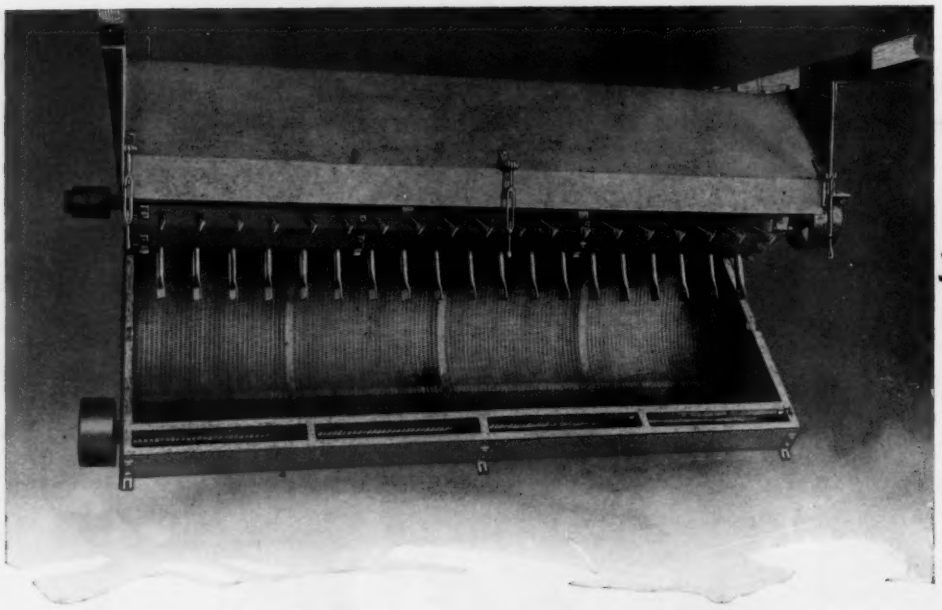
Fig. 73 "RENEWO" Fig. 1021 "FERRENEWO"

"America's Best since 1862"

THE LUNKENHEIMER CO.
"QUALITY"
LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD
NEW YORK CHICAGO CINCINNATI, U.S.A. BOSTON LONDON
EXPORT DEPT. 129-135 LAFAYETTE ST., NEW YORK

1300-20A-10

LUNKENHEIMER



Opens 25,000 Pounds of Cotton

Per Ten-Hour Day

In this day of high production costs, space and equipment must be saved—labor must be conserved—utmost efficiency must be maintained.

The MURRAY Cotton Cleaning and Aerating Machine is revolutionizing the opening of cotton. The MURRAY takes care of itself. It has a working capacity of 25,000 pounds of cotton per ten-hour day—the greatest capacity of any cleaning and opening machine on the market today. This means a great economy in time and labor.

The MURRAY Cotton Cleaning and Aerating Machine can be set into the cotton suction pipe between the opening room and breaker pickers, and hung from ceiling or other convenient support, thus eliminating expensive special connecting arrangements.

It has no hidden bearings that can't be seen or given attention while operating. Every bearing is in plain sight and can be reached without interfering with operation or stopping machine.

Either belt or motor drive.

These are only a few of the many advantages of the MURRAY.

We want to tell you more. Write us for the full and complete story.

No obligation for MURRAY service.

THE MURRAY COMPANY
ATLANTA, GA.

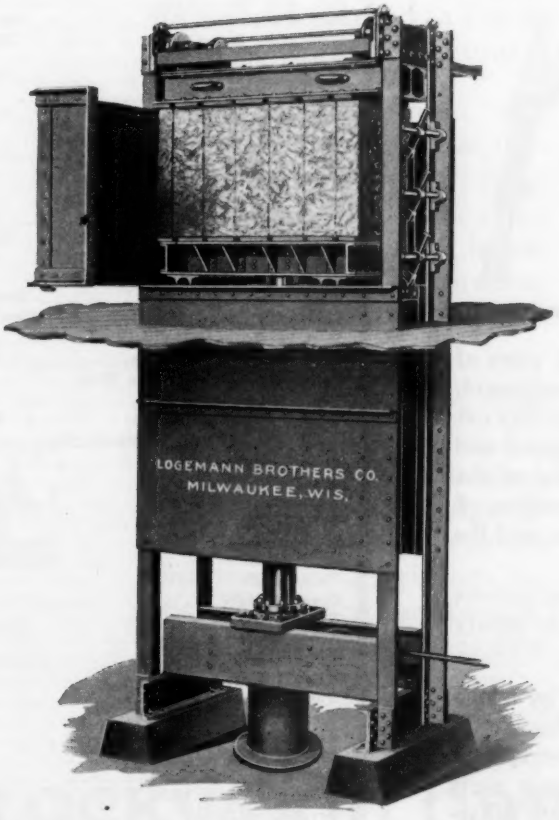
The Murray (PAT. PENDING)

COTTON CLEANING AND AERATING MACHINE

LOGEMANN

Hand-Belt-Electric-Hydraulic

Baling —— Presses



There Are

LOGEMANN BALERS

For All Purposes

In our line of more than eighty types and capacities will be found a machine to suit every conceivable purpose and condition from powerful hand-operated presses for baling clippings, to deep-box hydraulic machines for fluffy waste of all kinds.

Progressive mill operators are today adopting the LOGEMANN press as standard (*First*) Because of the quality of the workmanship, design and material; (*Second*) because of the stability of the company building these machines, and our reputation for speedy service on the comparatively rare occasions when repairs are needed.

A letter setting forth your baling problems will be appreciated.

LOGEMANN BROTHERS CO.

Main Office & Works - Milwaukee, Wis.

Let Us Add Your Name To This List

OUR service to textile mills is the result of years of experience in installing textile theatre equipment. Our representatives call upon the mills personally, lay out the plans, advise on the proper equipment required and finally supervise the installation and the starting of the theatre. In other words, they take the whole problem off your hands and do not turn over the work to you until the theatre is operating satisfactorily.

The textile industry is demanding the best moving pictures for their employees and that is why they regularly specify POWER'S PROJECTORS.

That is why more Power's Projectors are used by textile mills in the South than all other projectors combined.

We carry a complete line of supply parts and equipment at our various branches. Your orders for supply parts will be filled the same day the order is received. Whatever are your needs for your theatre, we can supply them.

We have a special offer for Textile Mills. May we present it to you?

Satisfied Users of POWER'S PROJECTORS

ALABAMA

W. A. Handley Mfg. Co.	Roanoke
Tallassee Mills	Tallassee
Fairfax Mill	Fairfax
Avon Mills	Sylacauga
Lanett Cotton Mills	Lanett
Indian Head Mills	Cordova
Selma Mfg. Co.	Selma
Buck Creek Cotton Mills	Siluria

GEORGIA

Elm City Cotton Mills	LaGrange
Bibb Mfg. Co.	Porterdale
Roswell Mfg. Co.	Roswell
Gainesville Cotton Mill	Gainesville
Bibb Mfg. Co.	Columbus
Pacolet Mfg. Co.	New Holland
Manchester Cotton Mills	Manchester
Milstead Mfg. Co.	Milstead
Thomaston Cotton Mills	Thomaston
Exposition Cotton Mill	Atlanta
Habersham Mill	Habersham
Trion Company	Trion
Union Point Mfg. Co.	Union Point
Hillside Cotton Mill	LaGrange

NORTH CAROLINA

Durham Hosiery Mills	Durham
Pamona Mills	Greensboro
Cleveland Mill & Power Co.	Lawndale
Rodman-Heath Cotton Mills	Waxhaw
Rocky Mount Mills	Rocky Mount
Cherokee Falls Mfg. Co.	Cherokee Falls
Roxboro Cotton Mills	Roxboro
Consolidated Textile Corp.	Burlington
Carolina Cotton & Woolen Mills	Spray
Erwin Cotton Mills	Duke
Cannon Manufacturing Co.	Kannapolis

SOUTH CAROLINA

Baldwin Cotton Mills	Chester
Tucapau Mills	Tucapau
Ware Shoals Mfg. Co.	Ware Shoals
Glenn-Lowry Mfg. Co.	Whitmire
Monaghan Mills	Greenville
Drayton Mills	Spartanburg
Victor Mills	Greer
Conestee Mills	Conestee
Kershaw Cotton Mills	Kershaw
Abbeville Cotton Mills	Abbeville
Chesnee Mills	Chesnee
Union-Buffalo Mills	Buffalo
Victor-Monaghan Mills	Seneca
Victor-Monaghan Mills	Jonesville
Pacolet Mfg. Co.	Pacolet
Aragon Mills	Rockhill
Graniteville Mfg. Co.	Vancluse
Woodside Cotton Mills	Greenville
Orr Cotton Mills	Anderson
Issaqueena Mills	Central
Clifton Mfg. Co.	Clifton
D. E. Converse Co.	Glendale
Winnsboro Mills	Winnsboro
Monarch Mills	Lockhart
Republic Cotton Mills	Great Falls

Southern Theatre Equipment Company

WILLIAM OLDKNOW, President.

No. Nine Nassau St.
ATLANTA, GEORGIA

THREE TWENTY-EIGHT CALIFORNIA ST.,
OKLAHOMA CITY, OKLA.

Eighteen Fifteen Main St.
DALLAS, TEXAS

BUSINESS *and* SENTIMENT

Some years ago a large foundry and machine shop was established in a certain city in the East. It didn't belong there. Freight rates, markets, competition—everything was against it. But it was built there because its owners wanted to live in this particular community.

Few business men will admit that sentimental motives play any part in their decisions. Yet a location for an industry is not infrequently selected by its owners for equally inadequate reasons.

The services of Lockwood, Greene & Co. includes expert counsel in the selection of locations. It brings to your problem the mature judgment of specialists on such questions as freight rates, labor supply, police and fire protection, availability of raw materials, accessibility of markets, competition, taxation, laws, transportation, possibility of expansion and climate. In the consideration of these matters, Lockwood, Greene & Co. draw from a fund of knowledge gathered from the experience of ninety-two years.

With location and site established, Lockwood-Greene service has only begun. Before it is completed it has covered every essential detail of the building operation from preliminary studies to the placing of contracts and supervision of construction. It is a completely rounded service.

Building With Foresight

A copy of "Building with Foresight," a booklet descriptive of what we have done for others, will be sent on request.

LOCKWOOD, GREENE & CO.

ENGINEERS

EXECUTIVE OFFICE, 24 FEDERAL STREET, BOSTON 9

BOSTON ATLANTA CHICAGO NEW YORK
DETROIT CLEVELAND CHARLOTTE
Lockwood, Greene & Co. of Canada, Limited, Montreal
Compagnie Lockwood Greene, Paris, France

THE FUNCTIONS OF THE ENGINEER

To Facilitate Clothing the World—By Improving Structures, Equipment and Process

SERVICE

SUBSISTENCE and clothing are the two major needs of human life. The textile industry caters to the latter.

In the amount of capital invested and business done, it is slightly smaller than the food products industry, but the manufacture of textiles is more profitable.

This is the natural result of more uniformly better organization, the application of better manufacturing methods and more modern machinery.

So many steps are required in bringing cotton, wool, silk or flax from the raw state to the finished fabric or garment, that the manufacturing processes have grown increasingly complex and require careful and conscientious study to keep them abreast of demand for quality and quantity and at the same time reduce cost and maintain profit.

This is essentially a technical industry that calls for the services of an engineering organization departmentalized to cope with the problems of each one of a widely diversified range of processes.

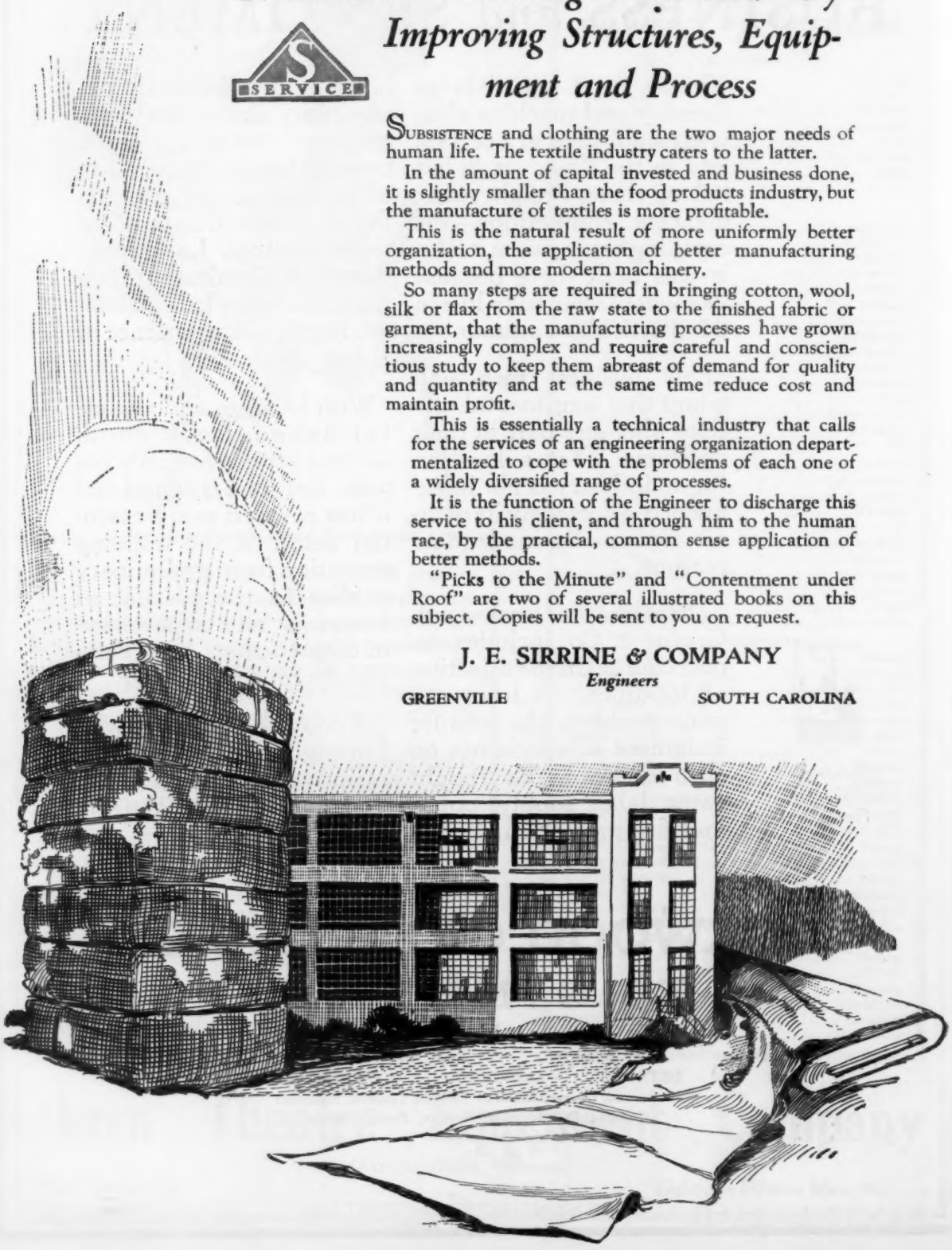
It is the function of the Engineer to discharge this service to his client, and through him to the human race, by the practical, common sense application of better methods.

"Picks to the Minute" and "Contentment under Roof" are two of several illustrated books on this subject. Copies will be sent to you on request.

J. E. SIRRINE & COMPANY

Engineers

GREENVILLE SOUTH CAROLINA



Boston Banker Points Out Advantages of South For Textile Industries

ALSTON H. GARSIDE, industrial service manager of the Merchants National Bank of Boston, in a recent issue of the New York Journal of Commerce, submits some data regarding textile mill conditions in New England and the South. In his article Mr. Garside brought out—

That for the first ten months in 1922 southern spindles ran an average of *60 per cent more* than northern spindles.

Southern spindles operated an average of 2,615 working hours, while northern spindles ran only 1,617 hours.

Southern mills averaged, on a normal working day, 10.2 hours and ran on an average of *110 per cent normal.* Northern mills, with a normal day of nine hours, ran at only 77 *per cent of normal.*

Southern mills not only ran their normal hours, but supplemented it with considerable night work; northern mills managed to run only three-fourths of their short day schedule.

In the first ten months of 1922 southern mills operated about 42,000,000,000 spindle hours; northern mills ran only 34,000,000,000 spindle hours, although southern mills have only about 16,000,000 spindles *against* 21,000,000 *for northern mills. The south, with 24 per cent less spindles, ran 24 per cent more spindle hours.*

In November, 1921, southern spindles ran an average of 252 spindle hours, against 177 for northern mills, and in December 289 spindle hours against 188 for northern mills.

Alabama offers more than any other state for textile mills—raw cotton, almost at the mill door; abundant hydro-electric and steam power; free factory sites in many communities; efficient native labor; cheaper transportation by water and rail routes. Full information furnished to all interested on application by—

ALABAMA POWER CO.

BIRMINGHAM ..... ALABAMA

Tennessee-The Heart

Development at Hales Bar on Tennessee River

This station of 50,000 horsepower capacity is one of the four hydro-electric plants operated by the Tennessee Electric Power Company. Other hydro-electric developments, together with steam reserve stations, give the system a capacity of 157,000 horsepower.

The Tennessee El

art of Industrial America

Your Power Costs!

Chargeable costs in textile manufacture center around three main items—cotton, labor and power.

Tennessee's plants have an enviable abundance of raw materials and stable labor, and hydro-electric plants furnish them with the class of power which they have found the most satisfactory and economical.

The generation of power by a mill itself calls for

1. A definite initial investment in power house building and equipment, together with certain fixed charges such as interest, taxes, insurance and depreciation.
2. A variable daily charge for fuel and supplies and a certain expense for labor and superintendence, and
3. An additional variable expense for repairs and maintenance.

The generation of power by any mill is an expensive proposition at best, and small losses in the power plant become big items at the end of the year.

It has been amply proven that electric drive in textile mills effects an increase in production of from 10 to 20 per cent. The absence of dust and dirt occasioned by steam equipment, numerous belts, shafting, etc., results in an improved quality of manufactured product, thereby making possible a 5 per cent increase in value. With individual motor drive, buildings and machinery can be arranged in the most efficient manner to secure proper manufacturing conditions.

Are you located in a section where you can secure a dependable and economical supply of electric power? Adequate power developments and facilities in Tennessee have been largely responsible for the continued success and prosperity of the industries in this state. The Power supply is thoroughly dependable and reliable and rates are as low or lower than in any other state east of the Mississippi.

We will gladly furnish any manufacturer interested with complete information regarding power and power costs, land sites available, facilities of transportation and any other data desired. Write us today.

FIVE ADVANTAGES IN TENNESSEE

1. Ideal climate the entire year.
2. Raw materials of all kinds in abundance.
3. Market facilities — unsurpassed rail and water transportation.
4. Ample supply of intelligent and stable labor.
5. Continuous and reliable electric power at low cost.

The Tennessee Electric Power Co.

Chattanooga, Tennessee

lectric Power Co-

Plant No. 1 at Ensley, Ala., where the famous "Ensley Basic Slag" is produced at the rate of 4,000 tons per day.

SLAG Headquarters for the South-

THAT title is not an idle phrase but a fact. For we control the only two sources of true Blast Furnace Basic Slag in the South and operate two huge crushing and screening plants whose combined capacity is 6,000 tons a day.

"ENSLEY" & "ALA CITY"
BASIC SLAG
CRUSHED & SCREENED

These two names, "Ensley Basic Slag" and "Alabama City Basic Slag," designate a scientifically prepared product greater in strength than stone, granite or gravel. A product generally employed as "coarse aggregate" in all types of reinforced concrete structures. A product used with uniform success in all standard types of street pavements and hard surface highways.

Service to Contractors and Highway Builders

We can save you money on shipments to practically all points in Alabama, Georgia, Florida, Mississippi and to most points in Louisiana and the Carolinas.

We can save you time. And time's money on a "big job." How? Our plant capacities are 6,000 tons per day. All shipments weighed at plant by certified weighmaster and delivered by our own locomotives to twelve railroads for immediate movement.

Birmingham Slag Co.

"Slag Headquarters for the South"

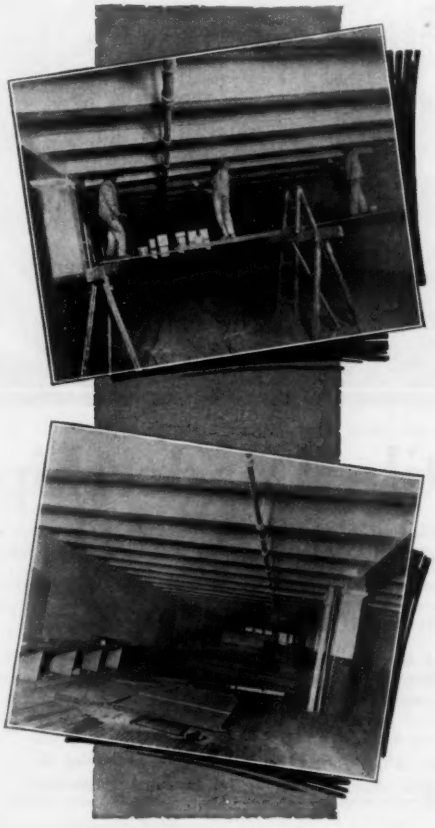
Atlanta BIRMINGHAM Thomasville

Plant No. 2 at Alabama City, Ala., where the well known "Ala. City Basic Slag" is produced. This modern crushing and screening plant has a daily capacity of 2,000 tons.

Use This Pure White Paint

Surlight is the whitest mill-white paint made. This is an actual fact that is open to demonstration—results will show that in every case, under similar conditions and service, Surlight is whiter when applied, whiter when dry and stays white longer than any paint or enamel you can buy.

The light-reflecting properties of Surlight paint add daylight to any mill, and this is a vital factor in increased production. In many cases it has actually been found that 8 to 12% more work could be turned out after Surlight had been applied.



Surlight promotes comfort among employees—Surlight painted walls do not glare or dazzle; they lessen eye strain and reduce fatigue. Sanitation and neatness are encouraged—corners and out-of-the-way places brightened up with Surlight are less apt to be used as dumping places for dirt and rubbish.

Surlight has a smooth, hard and non-porous surface. It lasts long, eliminates the necessity of repainting and can be washed as often as desired.

The pictures at the left tell the Surlight story—the next time you paint use this pure white mill-white paint and note the difference.

Get Interesting Book on Surlight

Considers the subject of Surlight Paint from every angle—what it is, what it does and how it should be used to obtain best effects. Send for this book—it will be mailed gratis on request.

We also make paints to meet all the requirements in textile mills and villages.

St. Louis Surfacer & Paint Co.

4211 Arlington Ave. **St. Louis, Mo.**

SURLIGHT

The Light Reflecting Wall Paint for Industrial Purposes

Distributor Service

BOSTON
Lewis E. Tracy Co.

CHARLOTTE, N. C.
Charlotte Supply Co.

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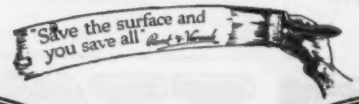

Textile Leadership

THE association of such a name as the Farr Alpaca Company with OJACO Mill White is most appropriate.

One stands for a recognized textile leader—manufacturer of pure alpaca, mohair lustres and worsted dress goods —with a daily output that is normally 125,000 yards.

The other is the paint that this Company selected to brighten up the interior of its great plant, pictured above. Result: More and better light at less expense.

Upon request, the nearest OJACO distributor listed opposite will explain why OJACO Mill White is unexcelled for the walls and ceilings of textile mill and other exteriors.

Oliver Johnson & Co., Inc.
Paint Makers since 1833
PROVIDENCE, R.I.

You can never know *too* much

about the Science of Lubrication

All right then! Here is your chance to begin learning more.

By this we mean any reader of COTTON can get the magazine "Lubrication" free for one year.

What is this magazine "LUBRICATION?"

It is a technical magazine devoted to the selection and use of lubricants.

Who publishes it?

THE TEXAS COMPANY, manufacturers of Texaco Petroleum Products.

Why do they publish it?

Because they believe the spread of more accurate information concerning Lubrication will incline engineers and executives to the wider use of better Lubricants and TEXACO Lubricants are better Lubricants.

What does the magazine "LUBRICATION" contain?

Technical and authoritative articles covering the use of lubricants in many industries. Usually there is in each number a comprehensive article dealing with some large industry, and some smaller articles on some other subjects—and *only three pages of advertising.*

What do I have to do to get it?

Right now it is only necessary to fill out the coupon. There is no charge at present.

Who may get it?

Anyone whose business or profession guarantees his sustained interest in this important branch of engineering practice. Thus the present list includes: Engineers, Mechanical Executives, Purchasing Agents, Technical Libraries, Universities, and YOU when you reach for your pen or pencil and do the necessary.

Free Subscription Blank

THE TEXAS COMPANY, U. S. A.
Texaco Petroleum Products
Dept. O, 17 Battery Place, New York City

Kindly put be on the mailing list to receive your magazine "LUBRICATION" Free for one year beginning with the January number.

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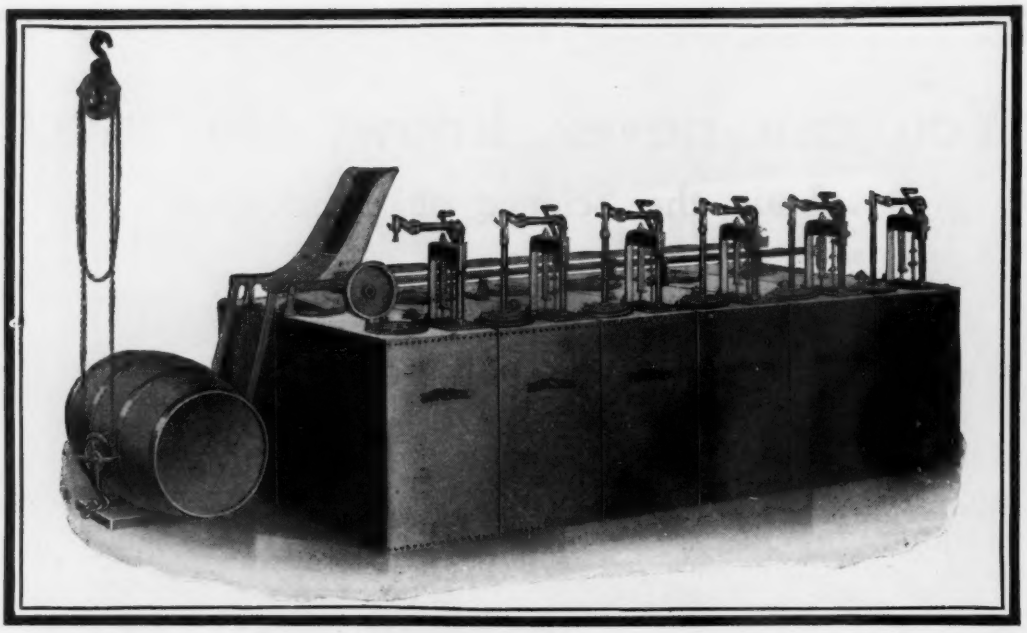
2-23



"Where Are Those Empties, Jim?"

"We don't keep empties any more, Bill. Now that we have the Bowser system, we transfer the oil right away, ship the drums back and get full credit."

You, too, can stop paying for lost drums. Install Bowser oil handling equipment, save storage space, eliminate the fire hazard, and cut out all possibility of spilling and wastage.

Bowser tanks are your guarantee against waste. Bowser piston-type measuring pumps assure you of clean oil, quickly and conveniently drawn.

Booklet A-45 tells how Bowser equipment can effect substantial savings in your plant. Write for it today.

BY INVITATION MEMBER OF

Bowser Products
For Handling Gasoline and Oils Wherever Sold or Used

Filling Station Pumps and Tanks for Gasoline.
Portable Tanks for Oil and Gasoline.
Storage and Measuring Outfits for Paint Oils, Kerosene and Lubricating Oils.
Carload Oil Storage Tanks.
Power Pumps.
Dry Cleaners' Underground Naptha Clarifying Systems.
Richardson-Phenix Oil Circulating and Filtering Systems and Force Feed Lubricators.

Write for Booklets

S. F. BOWSER & CO., Inc.

Pioneer Manufacturers of Self-Measuring Pumps

Home Plant: Fort Wayne, Indiana
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Representatives Everywhere

Branch Offices, with Service Departments, in Principal Cities in this Country and Abroad

BOWSER
ESTABLISHED 1885
ACCURATE MEASURING PUMPS

Spinning and Twisting Cylinders Should Always Be Strom Ball Bearing Equipped

There is a very attractive saving in power, freedom from flying oil spatter, saving of oil, and the labor of oiling, and greater ease in starting where Strom bearings are used.

Where individual motor drives are used, Strom Bearings are particularly desirable. They will stand the severe pull ot a small sprocket drive better than plain bearings, and will run cool at all loads and speeds.

Strom Ball Bearings can be furnished by any maker of spinning or twisting frames on new installations at a very moderate cost. Specify them when buying new equipment.

For bearings to apply to old frames, write to the Aldrich Machine Works, 529 Reynolds St., Greenwood, S. C., Textile Distributor for Strom Bearings.

U. S. BALL BEARING MFG. CO.
(Conrad Patent Licensee)
4544 Palmer Street Chicago, Ill.

Strom BEARINGS

"Wherever a Shaft Turns"

235

For Long Economical Service

COCHECO BELTING

Saving in first cost of a belting seldom constitutes economy.

Those who figure economy on the basis of *long service and low maintenance cost* are the ones who get the most in return for every dollar invested.

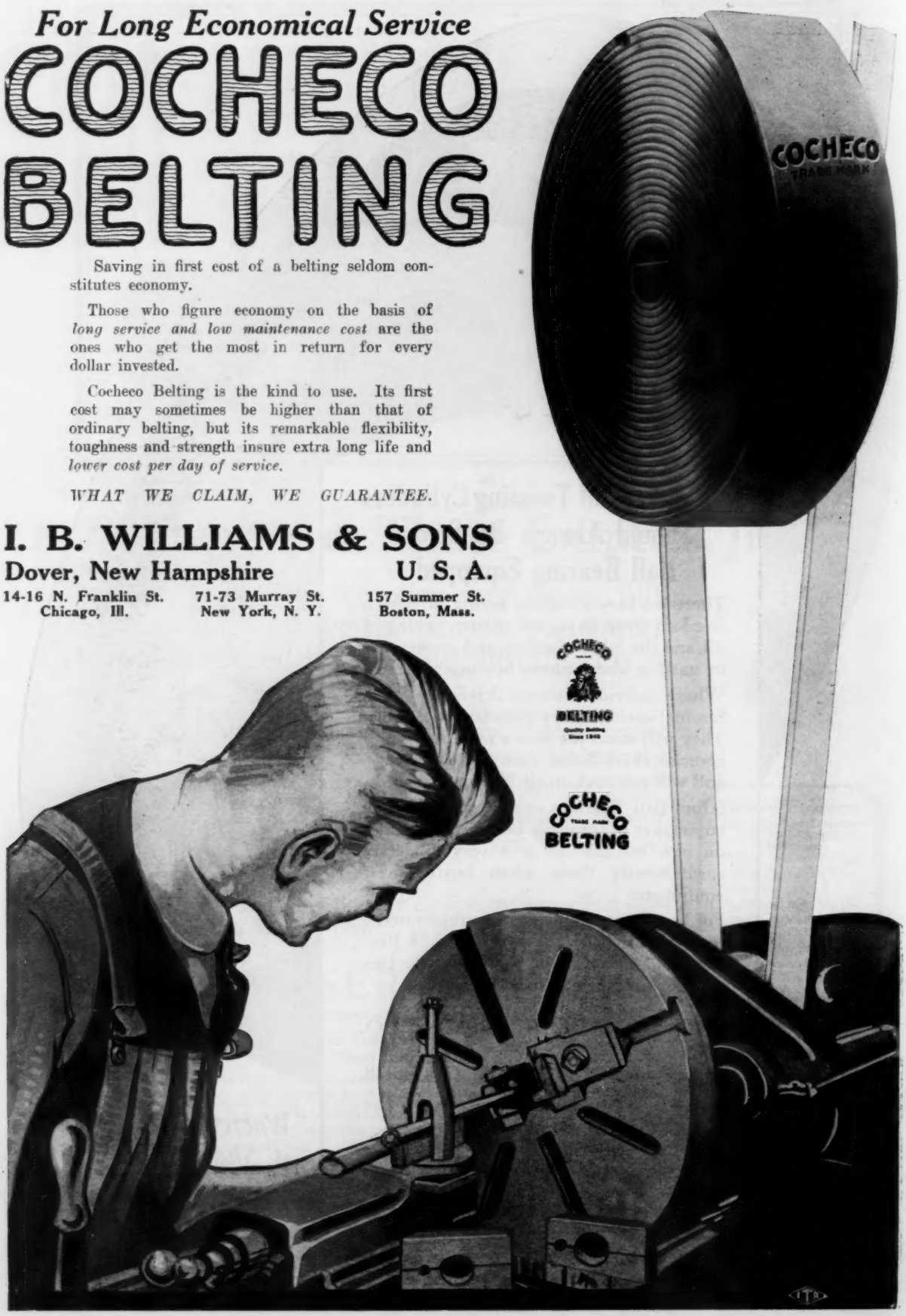
Cocheco Belting is the kind to use. Its first cost may sometimes be higher than that of ordinary belting, but its remarkable flexibility, toughness and strength insure extra long life and *lower cost per day of service.*

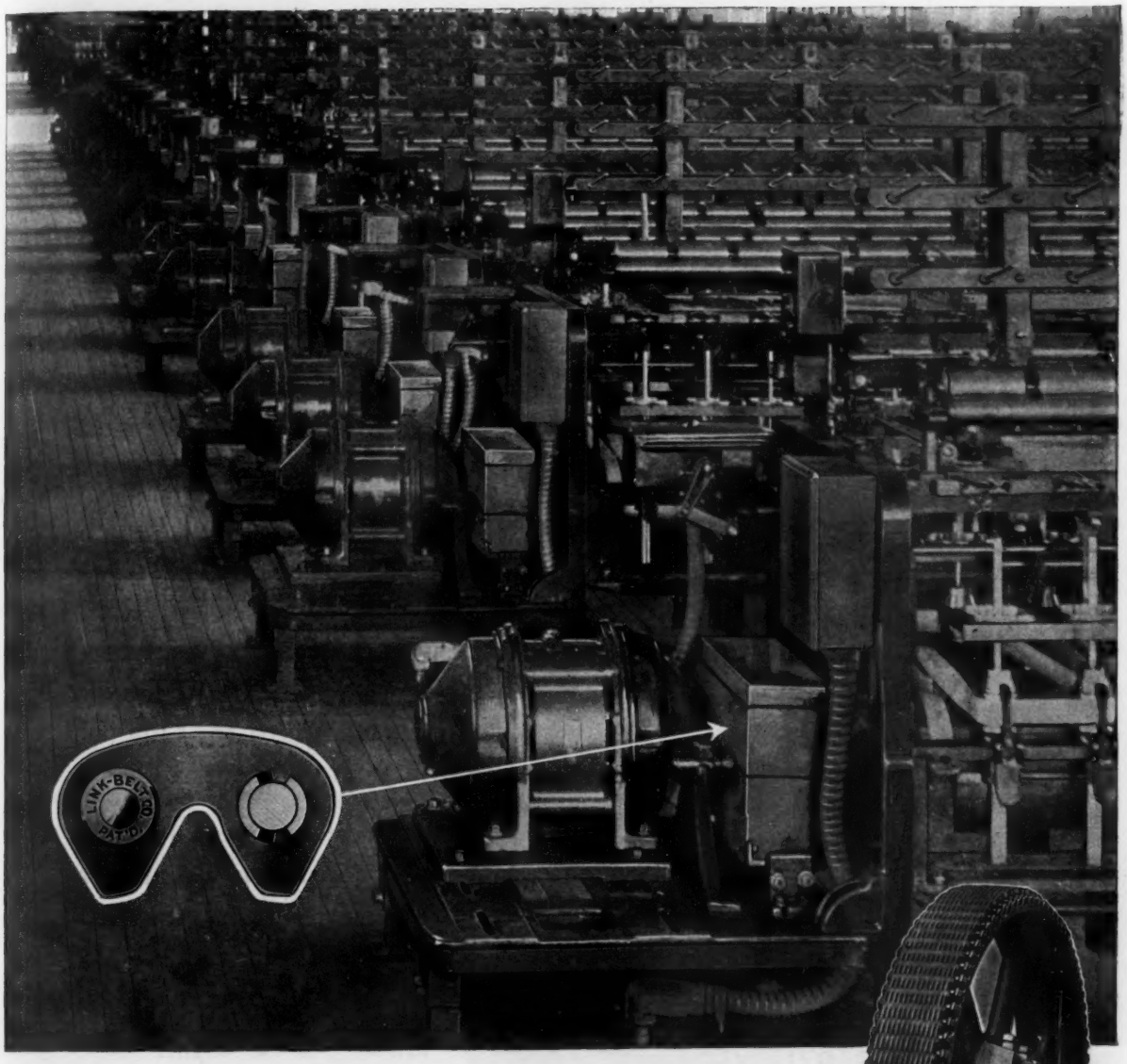
WHAT WE CLAIM, WE GUARANTEE.

I. B. WILLIAMS & SONS

Dover, New Hampshire U. S. A.

14-16 N. Franklin St. Chicago, Ill. **71-73 Murray St. New York, N. Y.** **157 Summer St. Boston, Mass.**





Chain Your Motor to Your Machine

WITH a Link-Belt Silent Chain Drive, you can transmit practically the full power of the motor—without slip or loss of power. 98.2% efficient—on actual test—is its record.

Our experienced power transmission engineers can help you get better results from your power transmission equipment. Their advice is yours for asking. Send for our specialist on textile machinery drives.

Write for books Nos. 425, 543, 544 and 487-A.

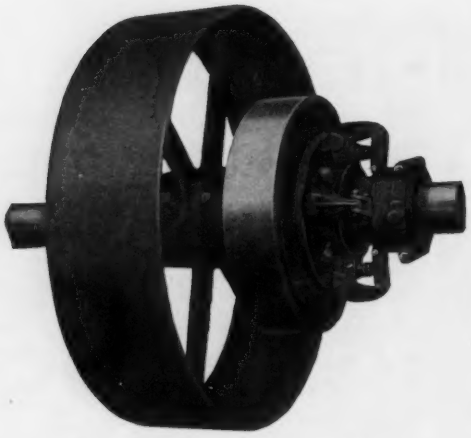
872

Flexible as a Belt—
Positive as a Gear—
More Efficient than Either.

LINK-BELT COMPANY

PHILADELPHIA CHICAGO INDIANAPOLIS
BOSTON—49 Federal Street CHARLOTTE, N. C.—J. S. Cothran, Commercial Bank Bldg.
ATLANTA, GA.—610-611 Citizens & Southern Bank Bldg.

LINK-BELT



Working entirely upon one line, the mechanical transmission of power, exclusively and continuously since 1857, our whole organization has been enabled to concentrate its thought and effort solely upon transmission problems.

The result of this concentrated effort has been a product recognized as the Standard for Quality, Adaptability and Dependability.

The Service which we created and which we constantly maintain does not stop with prompt delivery. It means more. It means the bringing to your assistance our experience of many years.

Concentration of Thought & Effort

We shall be glad of an opportunity to assist you in solving your power transmission problems.

T. B. Wood's Sons Company

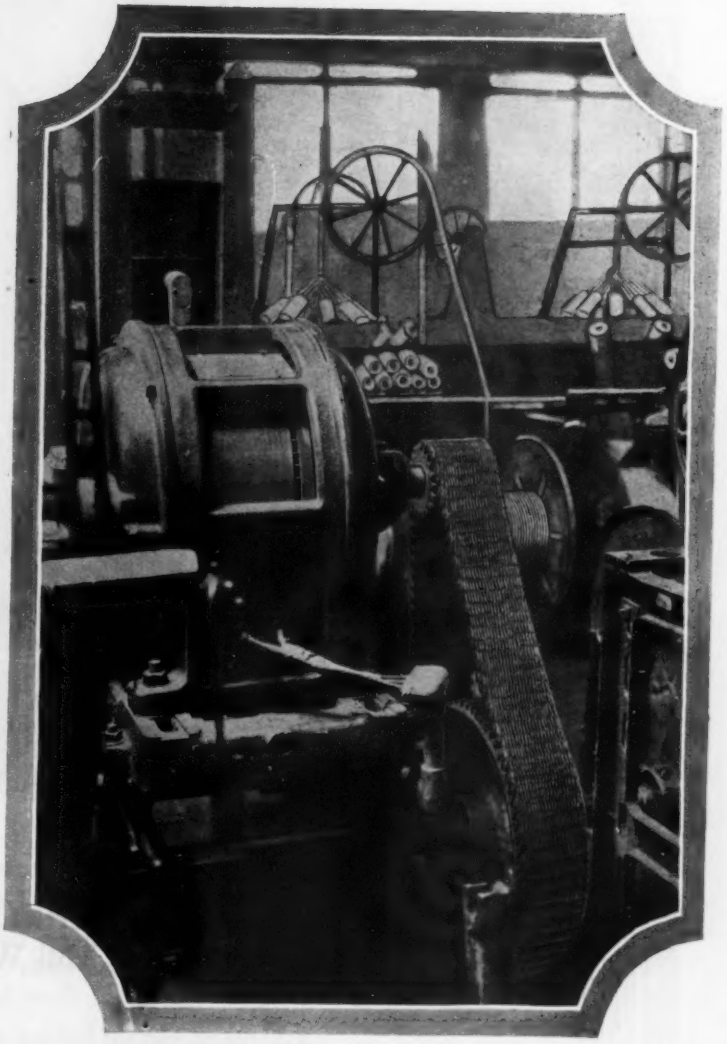
CHAMBERSBURG, PENNA.

POWER TRANSMITTING MACHINERY

MORSE SILENT CHAIN DRIVES

THE MORSE "ROCKER JOINT"

A Morse Silent Chain Driving Braiding Machines



The production capacity of a braider in the manufacture of garden hose, insulated wire and packings is materially increased with the Morse Silent Chain Drive.

No slippage, means uniform speed, a saving of power and resulting in better products.

Morse Drives are dependable, durable, require but little floor space and the upkeep is surprisingly low.

Run cool with less lubrication than gearing or other types of chain. Oil cases not required.

Our Sales Engineers are power transmission experts and will be glad to co-operate with you and assist without obligation.

Let us tell you more about them.

MORSE CHAIN CO. LARGEST MANUFACTURERS OF SILENT CHAINS IN THE WORLD **ITHACA, N. Y.**

Morse Engineering Service **BENEFIT BY MORSE SERVICE AS OTHERS DO** *Assistance Without Obligation*

Address nearest office

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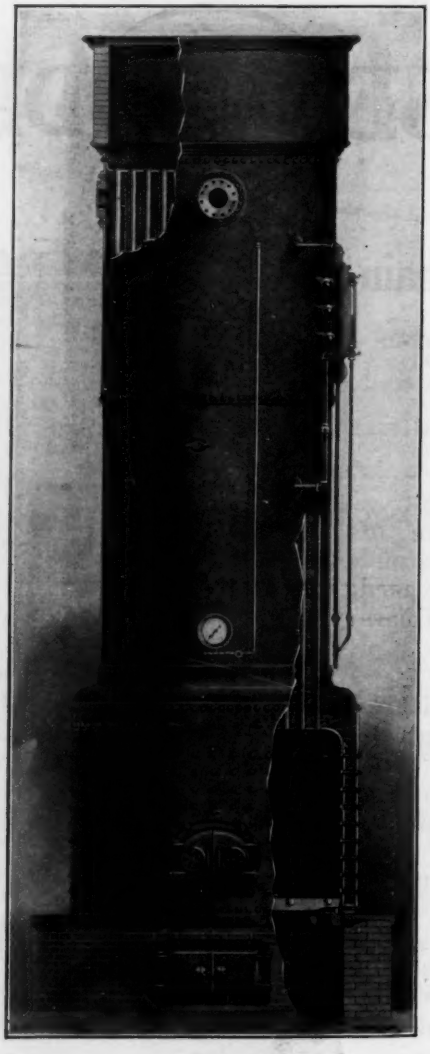
"Morse" is the Guarantee Always Behind the Efficiency, Durability and Service



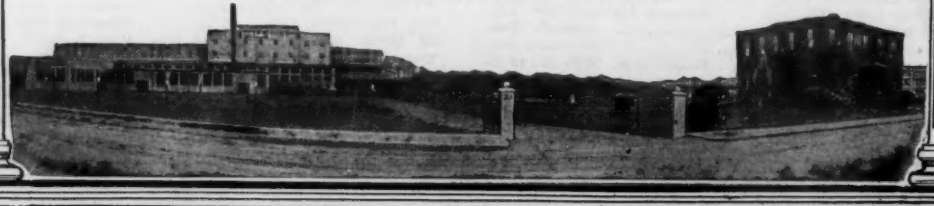
Manning Type Vertical Boiler
Adapted for Mill Work

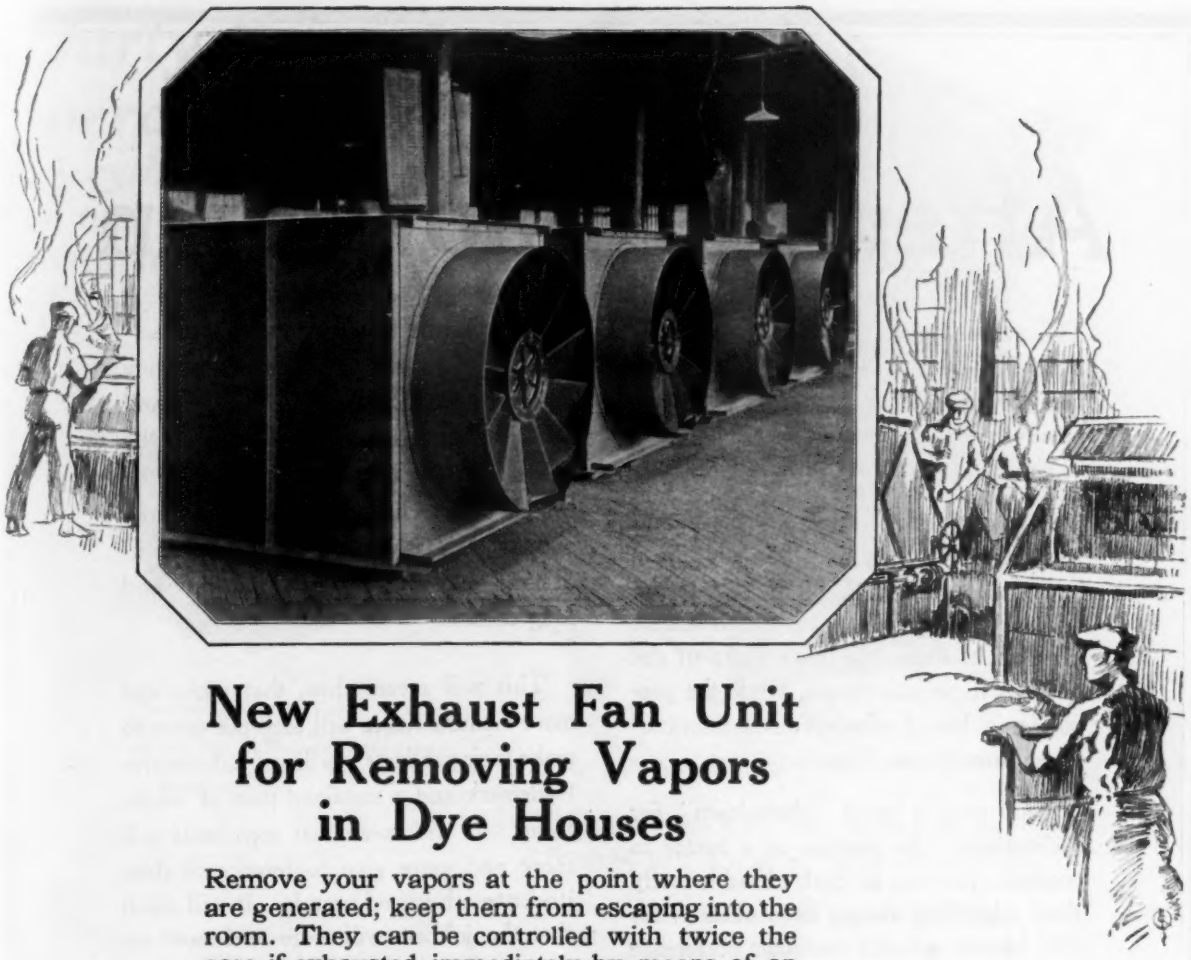
INTERNATIONAL ENGINEERING WORKS, Inc.
FRAMINGHAM, MASS.

Southern Representative,
Isaac Hardeman, Charlotte, N. C.

BOSTON
PHILADELPHIA

NEW YORK
SAN FRANCISCO





New Exhaust Fan Unit for Removing Vapors in Dye Houses

Remove your vapors at the point where they are generated; keep them from escaping into the room. They can be controlled with twice the ease if exhausted immediately by means of an American Blower Exhaust Fan Unit.

To assure best results, it is desirable to put hot, dry air in the room with American Blower Equipment.

Proper ventilation insures better working conditions, increased production and a better product.

Confining vapors at their point of generation and quickly removing them eliminates fog and dripping from the walls and roof.

These problems can be solved by our engineers, who through years of practical experience are particularly well qualified to cooperate with textile officials.

AMERICAN BLOWER COMPANY, DETROIT
BRANCHES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO (196)

American Blower

"Sirocco" TRADE MARK

EXHAUSTERS · VENTILATING FANS · AIR WASHERS · BLOWERS · ENGINES
FOR HEATING, VENTILATING, DRYING, AIR CONDITIONING, MECHANICAL DRAFT

After the Showdown

The great "buyers' strike" of 1920-21, a never-to-be-forgotten event in the economic history of this country, proved a point which must henceforth be recognized as basic and incontrovertible.

It was discovered by merchants and jobbers everywhere, in practically every line of merchandise, that it was the trademarked and adequately advertised brands of goods that got the lion's share of the business there was to get, while the preponderant loss of sales fell on the unbranded and unadvertised goods.

This was a great "showdown" for Advertising. Its position as a factor in economic life was on trial. Had it really done what had always been claimed for it? Had it created consumer preference that would hold against the keen competition of a sacrifice price on unmarked goods?

The verdict of the buying public was unqualified. It was not a straw vote to determine popularity. It was the final test of willingness to buy. The ballots were dollars. And the preponderant majority voted with their dollars that they preferred to keep right on buying advertised goods.

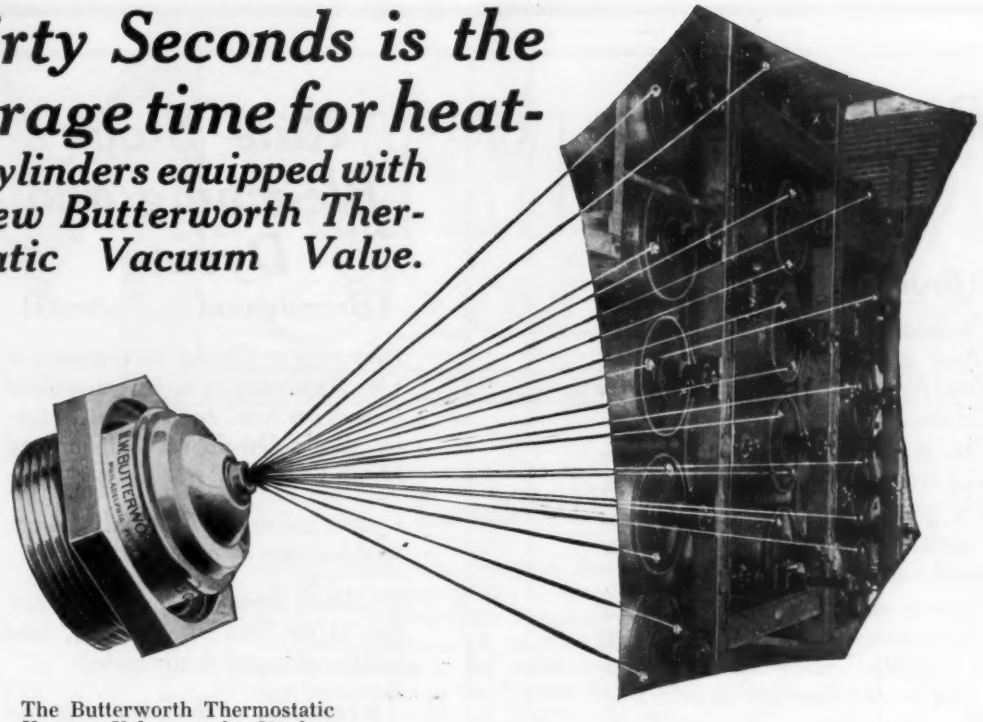
With the whole country on a reduced schedule of production and sales, the factories that were able to keep on producing, in anything like normal quantities, were invariably those making trademarked and nationally advertised goods.

All over the country today manufacturers, jobbers, and merchants are giving serious consideration to this important and conspicuously demonstrated fact: the public prefer to buy nationally advertised brands of merchandise. And public demand is the last word in all economic situations. No one can go against it and long endure.

This will mean, then, that more and more manufacturers will seek out ways to make their products worthy of a distinctive trademark and a sustained plan of advertising. It will mean that merchants will more and more give preference in their stocks to advertised brands. It will mean that the jobbers will more and more arrange to supply the merchant with advertised brands.

But new advertisers, manufacturers who are finally convinced that their future lies in the direction of an advertised product, will discover that the magic power of advertising cannot be applied overnight. It may require sustained effort to attain a position of equality with competitors who have been advertising for many years. This will be an unwelcome discovery. But it will be found to be the truth, and will be their only hope of gaining a substantial foothold in what, from now on, must continue to be a more keenly competitive market than we have known for a generation.

Thirty Seconds is the average time for heating cylinders equipped with the new Butterworth Thermostatic Vacuum Valve.



The Butterworth Thermostatic Vacuum Valve can be fitted to all drying cylinders, being interchangeable with the ordinary vacuum valve.

Compare this with time formerly required—from ½ to 1½ hours. And not only this:

Air pockets in your cylinders are eliminated. The cylinder heats up evenly all over.

These advantages in themselves are great enough but consider also that this new thermostatic vacuum valve under all conditions and more efficiently than any other vacuum valve prevents the collapse of cylinders due to sudden lowering of steam pressure.

We tell you all about the thermostatic vacuum valve in our folder "Uniform Cylinder Heating," and meanwhile remember that cylinders in all Butterworth drying machines are equipped with this new valve.

H. W. BUTTERWORTH & SONS CO.
Established 1820
PHILADELPHIA, PA.

Canadian Representative: W. J. Westaway Company, Hamilton, Ontario, Canada
Providence Office: Turk's Head Building
Greenville, S. C. Office: Masonic Temple Building, Milton G. Smith, Manager

BUTTERWORTH *Finishing* MACHINERY

Beam Bleaching and Dyeing

(*Brandwood's Patents*)

Up to twelve Beams, Bleached or Dyed at One Operation, Indigo, Vat, Napthol, Sulphur and Direct Colors.

Cost in labor and materials guaranteed less than by any other System.

We give definite guarantees in our Contracts as to cost of labor and materials and quality of work.

Users of our Bleaching and Dyeing Plants have the exclusive free benefit of Twenty United States Patents, giving great advantages in Warping, Bleaching, Dyeing, Drying, Quilling and Splitting, and not available by any other System.

We further give the use of valuable secret processes, and many years' practical experience. We start up the Plants free, and give free service at all times.

Reckoned on basis of production, our Plants are cheapest in first cost.

We are prepared to install Plants and take payment, as and when saved by their use.

Most of the Chambrays and stripes now manufactured in the U. S. and Canada, are bleached and dyed on our Plants.

Exclusive Patent Rights are still available for some States and Territories.

Raw Stock Bleaching and Dyeing

(*Brandwood's Patents*)

Bleaching or Dyeing continuously in One Apparatus up to fifteen hundred pounds per hour, Indigo, Vat, Naphtol, Basic Developed, Sulphur and Direct Colors.

Cost in Labor and Materials guaranteed less than by any other system.

Dyehouse labor in handling the cotton before and after dyeing, and hydro-extracting is eliminated.

Three-fourths of the labor costs and three-fourths of the dyehouse floor space is saved.

Spinning production considerably increased.

No shortening, weakening or matting of the cotton.

Colors brighter and evenly dyed.

We give definite guarantees in our Contracts as to cost of labor and materials and quality of work.

We start up the Plants free and give free service at all times.

Exclusive Patent Rights are being granted to Colored Goods Manufacturers for their own State or Territory.

For full particulars apply to

JOHN BRANDWOOD

ELTON COP DYEING CO., LTD.

BURY, ENGLAND

MATHIESON Chemicals

Leadership

THE Mathieson Company has become a dominant factor in the Chemical Industry, due to the initiative of its Engineers, and the alertness and efficiency of its Sales Department. The quick response to the needs and convenience of our customers in the Textile Industry is reflected in the offering of Liquid Chlorine in exact net weights in the customary steel cylinders. All Mathieson Liquid Chlorine containers now hold uniform weights of 105, 150 and 2000 lbs.

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The Mathieson Sales Organization, in co-operation with its Engineers, has devised a plan and worked out formulas for making up bleach liquors from Liquid Chlorine which will be of interest to all Executives in the Textile Industry.

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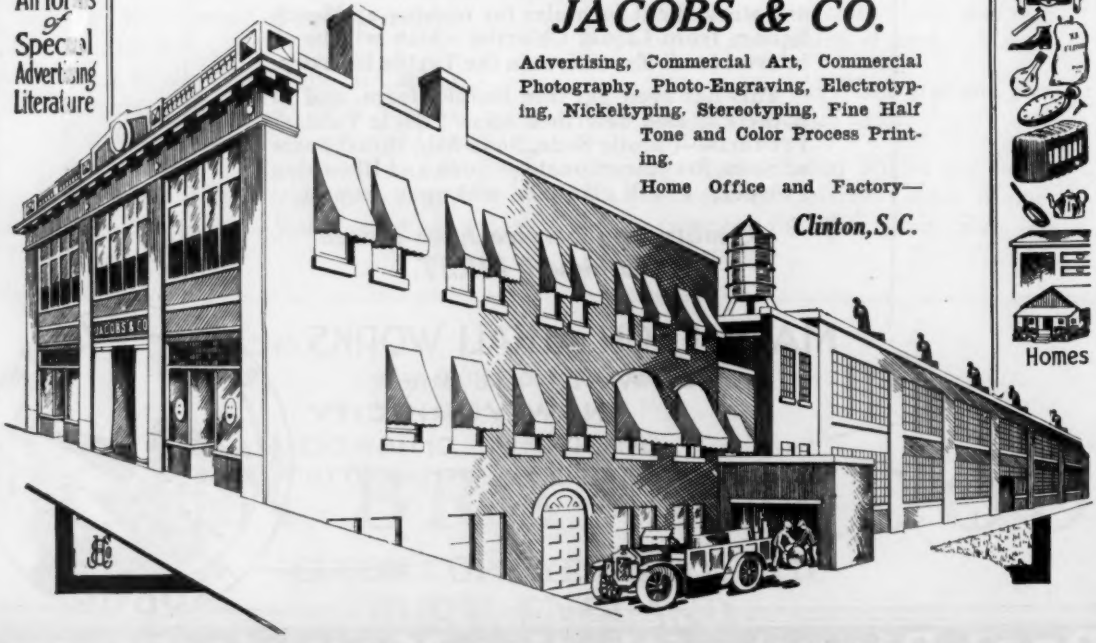

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COTTON

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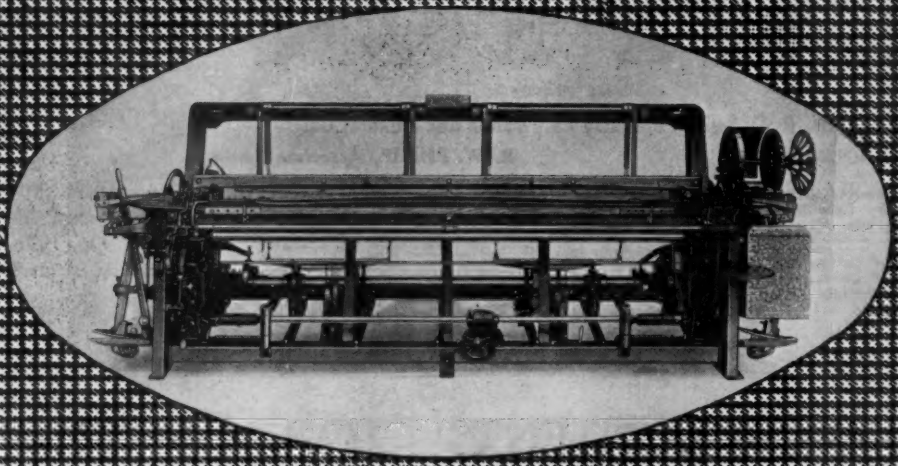

A new broad automatic sheeting loom recently brought out by Hopedale Manufacturing Co., Milford, Mass.

Carrying out their policy of building quality looms, the Hopedale Manufacturing Co., uses Hyatt roller bearings for crank and cam shafts of broad looms and also recommends the use of these bearings on narrow looms. Quality bearings are important parts of quality looms.

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Secure these loom operating economies for your mill, specify Hyatt bearings—it pays.

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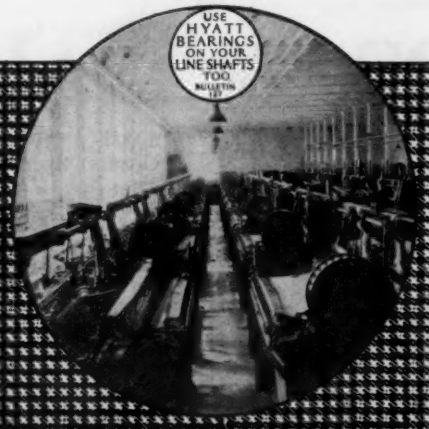

20 Hopedale Hyatt equipped 90" sheeting looms now in operation at Pepperell Manufacturing Company, Biddeford, Me.

With the Publishers—

I "Suppose" Advertising Pays

(Extracted from an article in Better Business.)

Ask the first ten men you meet: "Is advertising worth while?" Probably nine men will say: "I don't know much about it. I suppose it pays." The tenth man will know something about advertising. He'll be for it or against it. He'll say it pays. Or he will say it doesn't pay.

The serious part of this is that the nine men will, in all probability, feel perfectly sure that it doesn't make a particle of difference whether they know about advertising—whether it pays or doesn't pay.

This is serious, because before the next decade ends they are going to know that judicious advertising pays.

They are going to learn that advertising pays through one of two channels. Either they are going to study advertising—all its practices and all its ramifications—and find that it pays because it boosts their own businesses; or they are going to know that advertising pays because their competitors will prove it to them. And if they wait for their competitors to prove it to them, it won't make much difference whether they ever know that advertising pays. Their competitors will have them permanently outdistanced.

Advertising is regarded by most people as merely a factor in selling.

Good advertising has no such limitations. Good advertising helps every department of a business. Good advertising makes financing an easier matter. Good advertising helps the employment department. Good advertising helps the collection department. Good advertising helps the production department. Good advertising helps the purchasing department.

It makes financing an easier matter because it is always easier to finance a company that enjoys a definite good will.

It helps the employment department because workmen are always attracted to the leading companies in any industry, and advertising furnishes this prestige.

It helps the collection department because the dealer is always anxious to maintain his standing with the company whose goods are easy to move. And advertising helps move goods off the shelves.

It helps the production department because, if the advertising boasts of a standard of quality, the workmen gradually and unconsciously acquire a pride in maintaining that quality.

It helps the purchasing department because sellers are always anxious to say that among their users is the well-known Blank Company.

So advertising touches every department and every phase of business. No executive, no matter what his capacity, can afford to profess ignorance of the bearing that advertising has on the success of industry in general, his own business specifically, and his own department in particular.

He can no longer "suppose" that advertising pays. He must know that advertising pays or doesn't pay. And just why it pays or doesn't pay. If he doesn't know these things, sooner or later he or his company, or both, will suffer through this lack of knowledge.

If you want your business to lead, interest all your executives in advertising.

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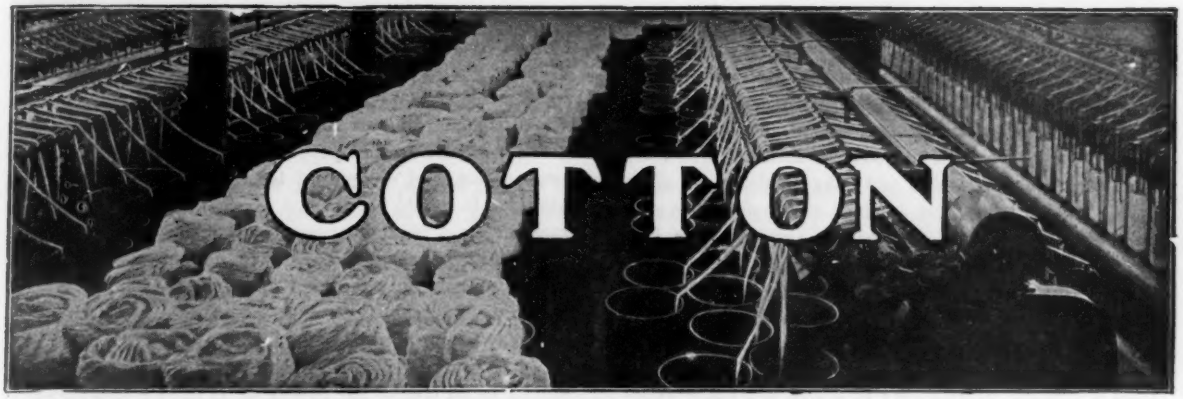

February, Nineteen-Twenty-Three

Those European Debts.

Several months ago a United States Senator speaking in Congress declared, succintly, that debts owed the Federal Government by European countries on account of the war loans made should and must be paid. That Senator happens to be a highly successful business man, a financier and industrial operator. A few days after he made the speech a Washington correspondent, in discussing another subject with the Senator happened to ask if a certain proposal was likely to become effective.

"There's about as much likelihood of it," the Senator replied, "as of our ever collecting any substantial sums from our European debtors."

The Senator's opinion is believed to be very much the attitude of most of Washington. Federal authorities say that the debts should and must be paid. Scarcely a single authority in the Government, whether of the dominant or opposition party, has dared advocate or even to predict cancellation or any action tantamount thereto. But you will find very few persons among them who personally—without risk of being quoted—will express any hope of those debts ever being paid in anything comparable to the money and products for which they were contracted.

The debts, with accumulated interest, now amount to more than eleven billions of dollars. Unpaid interest approximates a billion dollars and is growing at the rate of several hundred millions a year. More than four years have passed since the bulk of the debts were contracted. Virtually all that has been paid on them is $100,000,000 in interest recently taken care of by Great Britain. Over one-third of the debt is owed by Great Britain. Our second biggest debtor is France. The balance of the debts are scattered among most of the European countries that were on the side of the Allies, including Russia and, though for only a small item, Liberia in Africa.

Those most optimistic and insistent about collecting the debts really have no hope of repayments being made by other than Great Britain and possibly France.

As this is written, the British Debt Commission is beginning its conferences with our Government, having in view the arrangement of a definite repayment program. The members of the commission insist that Britain will repay fully, both interest and principal, and some engagement to that end will probably be made before this is printed.

But whatever engagement is made for payment "in kind" it doesn't follow that repayment will be assured even from Great Britain. Unless Congress gives our Treasury officials more leeway, which is unlikely, the engagement, no matter how solemnly entered into, will be of the nature of only a temporary arrangement. For Congress has decreed that no arrangement not contemplating a 25-year funding at not less than 4½ per cent interest may be entered into. Virtually all students of the subject are agreed that such an arrangement cannot be carried out safely to ourselves. They say so openly if they happen not to be amenable to public opinion; privately, if they are officials and therefore subject to what appears to be the public will. For public opinion is (or is so construed by those in power) for collecting the debts to the last penny of both interest and principal, and is against quibbling.

Elementarily, public opinion is right. They are just debts. If not paid by those who owe them they must be paid ultimately by the American taxpayer who now, for four years, has been carrying the interest on them.

But there is a huge difference between the payment of the debts, which are covered by outstanding Federal securities, by Americans and by Europeans. If paid by Americans, the payment will be, as in the case of interest already paid, to themselves; that is, when considering the matter from the point of view of the country as a whole. Our national securities being held almost wholly by Americans, the payment of neither interest nor principal on them calls for the exportation or importation of either gold or goods. But for them to be paid "in kind" by Europeans calls for the importation of gold or goods or the performance of services, like ocean shipping. They haven't and probably will never have the gold. Besides, since we have about one-half the gold in all the world, payment in that form would annihilate all remaining remnants of the gold standard and vitiate all the world's currencies, including our own. One of the healthiest of current signs is the lessening of our gold stores and the increasing of those of other nations.

If paid in goods, those goods must be sold at less than the amount at which we can produce similar goods. And as we draw on Europe for no great amount of raw material, those goods would have to be largely of kinds we manufacture, such as textiles and machinery. They would thus displace our goods in our own domestic market, and thereby slow down if not close many of our factories. That the direct gain would surmount the indirect loss is doubtful; certainly the new tariff act is based on the theory that

most of the goods we would have to absorb should be kept out at all costs.

Secretary Hoover's contention that the debts might be paid largely via "invisible balances" has much merit. It presumes collection in the form, say, of raw materials from South America paid for in goods manufactured in Europe. That very probably would mean the displacement of much of our foreign trade, just as much of our shipping already has been displaced, as well as the erecting of a barrier against further development of foreign markets, as in Latin America and the Far East, for many of our products.

Great Britain might meet her debt without harming our trade by transferring to us property owned say in such regions as South America. We know very well that the British will not do that. If they pay "in kind" at all, it will be in goods or services; indeed, it may come to the point where Britain will insist on paying in order to be free to dump goods into our markets, and force us to abandon some of our industries and scrap our merchant marine on behalf of hers. It might be possible for the British to use the debts for securing trade and shipping monopolies that in the long run would be worth many times the face value of the debts.

The subject is so complicated that it can't be handled on the basis merely of what our debtors should be "made" to do as a simple act of primary justice.

Owing to the state of public opinion regarding it, the problem isn't likely to be settled for some time to come, certainly not within a few months. Prophecy is futile; but the adjustment most likely to be made in the end is our acceptance of intangible assets in repayment. These probably will be colonies, most likely West Indies islands now in the possession of France and England with perhaps a few inglorious spots in Africa or the Far East.

Whatever should be done, it may be taken as a reasonable certainty that no appreciable part of the debts ever will be paid "in kind," that is in real money or real goods.

Watch the Immigration Question!

It is unlikely that the present Congress will enact any further legislation of importance with regard to immigration. The subject thus remains in the suspended status given it by the passage of the "3 per cent" proviso, which, unless again extended, will expire on June 30, 1924.

Fear of public opinion, if nothing else, has kept Congress from modifying the stern restrictions now prevailing. All men in national public life say that the American public is now overwhelmingly opposed to wholesale immigration from Europe or other continent. But the fact that Congress has not supplanted the "3 per cent" barrier by more equitable exclusion legislation shows that the powers-that-be are not entirely convinced that public opinion will continue as it is on the subject. They are waiting.

Meantime, stronger forces than evinced on that side since the war are now exerting themselves to the limit in favor of a lifting of existing barriers. Large employers' organizations, big combinations of capital, the force of gigantic industries are now seemingly arrayed on the side of immigration which, until lately, was espoused mostly by sentimentalists and certain factors in the more or less foreign elements of our population.

There is no sentiment in this new propaganda; quite the contrary. It grows out of one single desire, perhaps one and possibly a passing need: cheap labor. The revival of business, the exceptional volume of construction called for by conditions that can't last, the natural demand of the scarce common laborer for more than a common wage, all give propulsion to that propaganda. It is a very insidious propaganda, and dangerous, too, because of the force behind it. It should be watched for sooner or later Congress must define a permanent immigration policy for the country. That policy should connote no transient need. It should connote only the kind of America we want to exist 25, 50 or 100 years from now—above all, an America with a homogeneous population.

Modern-day students of the subject point out that there should be no fear of our procuring as large a population as we need, even without any immigration. Even though no foreign immigrants had come to the country during the last hundred years our population now, probably, would be as large as it is. But, coming from natural increase, it would be a different population.

Internal needs will take care of themselves in time, even that for more common labor in industry and on the farms in some sections.

Just as we shouldn't open the immigration floodgates in order to make up for a passing shortage in common labor, there should be no return to old policies because of pitiful conditions among certain foreign populations, like the Armenians and the Asia Minor refugees. We are not responsible for those conditions, wide-open immigration doors would not correct them, and it is virtually impossible to unleash the floodgates for one purpose without letting them stay open for all who may come.

Net immigration to the country is now less than 100,000 a year. Even that is not distributed as it should be. While the present arrangement can be improved it is doubtful if anyone can frame a perfect immigration law from any premise.

Cotton Manufacturing In China.

Renewed interest in cotton manufacturing in China has been created by the recent announcement of the plans by the newly organized Universal Textile Corporation to further develop the industry in that country, a further reference to which is made on page 345. The corporation, which includes leading Chinese and American interests, plans the erection of a 30,000-spindle mill in Shanghai to constitute the initial unit of an extensive construction program, and the agent of one of Massachusetts' large mills has gone to the Orient to assume active charge of the corporation's activities.

Almost co-incidentally with this announcement, Arthur L. Burton, who has been in China for a number of months, returned to this country on a business and pleasure visit. Mr. Burton has been intimately associated with Chinese cotton manufacturing in the position of chief engineer to the four plants of the Pao Cheng Cotton Mills, in Shanghai, Tientsin, and Soo Chow. On his trip to America, he was accompanied by James S. Liu, son of P. S. Liu, the managing director of the Pao Cheng Mills. These gentlemen visited cotton growing and manufacturing sections of the United States.

A keen observer, with an extensive background of

(*Continued on page* 329.)

Chinese Cotton Mill Practice

A Composite Picture of Methods and Conditions in Chinese Mills

By BEN Y. LEE.

Many textile men in America who have had no chance to visit Chinese cotton mills may have a notion that the inside conditions of these mills are dark and mysterious and that everything goes wrong. Those fairy tales may have been written or told, but remember the proverb, "Seeing is believing." Of course the habits, nature, agility, etc., of the Chinese workmen should be considered, as well as the mill managements, the cotton used, the yarn spun, the climatic conditions, and the social, economic and political background, as these all differ in many respects from the same features in America. Efficiency is low as the wages are low and vice versa.

This article is written as an explanation and description, but not as personal opinion or argument. The writer is not responsible whether, in the opinions of the American readers, the practices given here are right or wrong. If any interested readers desire any points to be explained further, they may send their questions to the "How Other Men Manage" Department of COTTON, and they will be answered, if answerable.

The first question which may not be directly connected with my personal experiences, yet which may be asked by the readers is: how is a Chinese cotton mill promoted and financed? Only a few mills offer their shares for public subscription. Most of them are secretly promoted and financed with their large shareholders unknown to the public. A man may be intimately connected with a mill for years, and yet he frequently doesn't know all of its larger shareholders, who, few in number, financed the mill. For these reasons, annual financial statements and the actual amount of profits made are hard to obtain except by guessing. Prices of the shares are unknown for they very seldom change hands. In Shanghai and its neighborhood, most mills are promoted by business men with some unknown "gods of wealth" behind them, but in the interior, the majority are promoted or owned by ex-officials whose wealth may run up into millions. The readers can readily see how a mill is organized under such conditions. In many cases a foreign firm may get contracts to furnish every detail until the mill is producing yarn or cloth, and then it is turned over to the owners for so much.

Then comes the question of cotton. Tungchow is the best native cotton and commands the highest price, its fibers are about 7/8 of an inch long. Then comes Shensi cotton. The latter is compressed as it comes to Shanghai, or to some distant ports, and the rest is packed loosely in bags weighing from 100 pounds up. The standard of moisture is eight per cent but often as much as fifteen per cent is found. Watering and putting white powder in the cotton are very common practices. Often cucumbers, bread, etc., are found in the bales.

The price of Chinese cotton fluctuates frequently, depending on the price of American cotton and the general business conditions in Japan. Very often a fluctuation of two or three dollars occurs between morning and afternoon. As there are no government reports or statistics concerning the forthcoming crop each year, the cotton dealers speculate according to the weather, that is, if there are heavy rainfalls or storms before the first picking, the price shoots up, while on the other hand if nice weather prevails during that time the price drops down, and so on, working in a cycle. Certainly there is a great risk in buying cotton unless one has years of practical experience in the business. Cotton is bought either from the cotton dealers or from the cotton exchange company, according to the name of the cotton—such as "Tungchow," etc.—but not according to the staple, which may vary from 1/16 to 1/8 of an inch. Cotton is sold in lots of 500 to 1,000 or more piculs (a picul = 133 1/3 pounds) at a time, and no chance of sampling is given. It is almost impossible to obtain even length of staple in a lot of this kind. Chinese cotton is clean and well ginned, but, great heavens, you should see a bale of dirty Indian cotton! Almost every Chinese mill at one time or another uses such cotton. The writer has seen some bales as blue as a typewriter's blue ribbon, while others may contain as much as 30 per cent in weight of broken seeds. When using such dirty cotton—of course, though, not every bale is like those just mentioned—the mills have lots of trouble keeping their machinery cleaned, especially the flats on the cards.

In recent years nearly all of the new mills are being built of re-inforced concrete of two or three stories, except those under Japanese influence, or belonging to the Japanese, who believe one-story brick buildings to be better. The total cost of concrete buildings, including office, warehouses, etc., is about $150,000 Mex. per 10,000 spindles capacity. The designing of the buildings is done by either foreign or Chinese architects. The lay-out and speeds of machinery are worked out by foreign firms who sell the machinery. Generally speaking the whole lay-out is based on spinning 14s yarn.

Improper design and the size of the dust chamber under the picker room has given inconvenience and trouble to the owners of many new cotton mills, as does also the dust flue or chimney. The architects, when designing the buildings, generally have given no especial thought nor consulted with textile experts as to what the area and depth of the chamber and chimney should be. This kind of business is practically new to them. Two years ago the picker room building of a 50,000-spindle mill in Tientsin was in process of cementing, but it was found that the area of its dust chimney was only 13 x 7 or 91 square feet, and the diameter was about four feet deep and two feet wide. Immediately the work was ordered to be delayed for the time being and the architect was called in for an explanation. The first question put to him was as to where and how he manufactured such an idea and he said, "I copied the plan from another cotton mill." He was next asked as to what was the size of the spinning mill from which he had copied his plans, and he said, "A 10,100-spindle mill. Isn't that all right? Cotton mill is cotton mill. What's the difference?" Finally the area of the chimney was doubled and the chamber modified to a great extent to suit the conditions. The mill had to spend a thousand dollars extra for this tech-

nical ignorance. There are some mills, however, whose dust chambers are equal in area to the space occupied by the pickers, that is, the full size of the picker room. Such mills get rid of the dusty atmosphere in their picker rooms, get cleaner laps and seldom have fires in the chamber due to the accumulation of waste. Whereas so many have their chimneys built too small, perhaps less than four feet per fan, narrow paths in the chamber where waste accumulates and is difficult to be removed, and very often in such mills fire starts in the pickers, ignites the waste in the chamber and then the whole picker room catches fire. The writer has seen a mill have two fires within a month, the loss amounting to several thousand dollars, all on account of an improper design and smallness of the dust chamber and chimney.

Now let us pass on to the mixing, opening and picking process, and see what they are doing in China. As dirty compressed Indian cotton is used, almost every mill has a willow of Japanese make, the price being cheap and delivery prompt. It is used as a bale-breaker. From this machine the cotton goes to a vertical opener. Some mills under the Japanese influence don't use the vertical opener at all, in the belief that it injures the fibers. One mill uses two vertical openers in tandem, which gives very satisfactory results. A few mills have a special room for mixing, or bins big enough for the cotton to lie over 24 hours. Nearly all Chinese cotton is packed loosely in bags, unlike American or Indian cottons which need longer for "airing."

Generally about ten per cent of low middling cotton is mixed with others to spin 16s; about ten per cent fair middling and 20 per cent low middling is mixed with others to spin 20s. In many mills the cotton bins are built of wood, and whenever there is a fire in one bin it spreads over all the bins, causing considerable damage, and also in some cases the waste machines are located in the same room with the pickers.

In some mills the condenser has given some trouble when the picker man changed the speed of its cage to 30 per cent or more higher. The machine builders recommended this speed to be around 110, and when it is changed to 150 or so, the draft is too high, and the cotton when passing between the cage and the wooden roll curls up many turns before dropping down on the delivery apron, and sometimes shoots upward and downward on the cage for a while. The speed of the condenser fan is around 1,100, which is necessary as the cotton is heavier than that used in America.

Very few mills use three processes of pickers, as the conditions do not demand it. In general, one finisher picker is used for 5,000 spindles. The speeds of both pickers and fans are around 1,100 r. p. m. As Chinese and Indian cottons are heavier, it is necessary that the fan speed be about equal to that of the beater. There is not a single case where the fan speed is 50 or more revolutions per minute less than the beater. When using dirty Indian cotton, the dust bars in the pickers are clogged with sand and broken seeds between the open spaces and cleaning should be done every few hours. It is up to the machine builders to invent some device so that the space between these bars can be widened according to the cleanliness of the cotton without a great deal of labor.

Many "pros and cons" have been advanced in regard to the merit of the carding or Kirschner beater. Fortunately a mill here had equipped its finisher picker with this kind of beater. It works very satisfactorily for the first year or so, but after using for some time, some of the pins have become bent, some have broken and some have become too dull. Here in China it is pretty hard to find machinists to repair them by putting all of the pins on the same planes. Even if new ones are ordered it takes several months to get them here. And what can be done in the meantime? Under present conditions, these beaters are certainly not advantageous unless one is willing to buy a lot of them for stock.

The top and bottom cages are easily damaged due to frequent fires in the pickers. Many mills make their own cages by drilling holes about ⅛ of an inch or about 30 such holes per square inch on iron plates. These cages last much longer and also are cheaper than those bought from America. Many foreigners claim that these cages don't have enough air space, and consequently produce dirtier laps. What do the readers of COTTON think? One time an American, examining some pickers, suggested that a piece of thin iron plate should be put on the grid bars between them and the feed rolls in order that good cotton could not fly off. A fitter put this question to him, "If it should be done, why didn't your machine builders make the machine that way?" Finally the matter was dropped. To be or not to be, that is the question I wish to put up to the readers.

In most mills, no technical men are employed. The picker room "Number One" man does everything on the machinery end. He generally learns the settings of the various machines mechanically, not knowing how they are related. Once he learns a certain way, it remains that way always. Sometimes the beater blades have been used for years without reversing the sides until ordered to do so from higher authority. It has often happened, during sticky weather, that some cotton rolled up on the feed rolls of the finisher pickers and then raised the evener motion till the belt moved to the back end of the cones. Workmen, seeing that the belt might slip off, would put a piece of cotton between the belt guide and the quadrant, thus causing thin laps. The doors on the frame sides are often placed on wrongly, causing a current from the fans blowing out.

In pickers of English make there is no split-lap preventer, so the workers use roving to go with laps to prevent splitting. This little American improvement is very much liked by our workmen. Usually one picker tender attends one machine and generally cleans the cages once a day just before the time of changing shifts, which is too long a time to wait to do this. Sometimes oil overflows to the edge of the beater blade and cotton sticks on it, which causes bad selvages on the laps. On the average, about 40 pounds of waste is taken from under the beater of the finisher picker per machine per 12 hours.

The American firms in China or the machinery builders in America have always been giving 36 to 38 cards per 10,000 spindles, while the British give 40 cards. There is no reason why there should be such a difference between the two. The English cards have no flat stripping wooden rolls, consequently the strippings fall down on the doffer bonnet. In this one respect the Chinese workers like the American cards better.

Nearly all the cards sent to China are equipped with one mote knife, as there is too much waste taken off with

two mote knives. When using Indian cotton, the dirty kind especially, the broken seed and other foreign matter sticks on the flats so deeply that removal is difficult except by a special hand-made brush made from card clothing.

Should the flats be run faster by using a double worm to drive the flats? That is another question for the readers to decide.

In a few mills, after running only a couple of years, more than half of the doffer roll bearings wear out and are cut like screws. Whether this is due to bad oil, broken wires dropping down and mixing with the oil, or from some other mysterious way, hasn't been discovered, and I wish someone would discuss this question.

In one mill particularly after running for three years, the teeth of all of the flat-stripping combs were worn out on both ends. The reason given was that waste accumulated on the flat pulleys, raising them higher which in turn wore out the combs. Flat strippings on the flat-stripping wooden rolls often become too big before taking off, thus causing the springs on the sides to get out of balance. In one mill all of the motor belts were run with the slack side downward. Many claim that is right. Is it? Just think a minute and give us your idea.

All card cylinders run about 165 r. p. m. The speed of the doffer is, on an average 12. The cans in which the sliver is delivered often become too full before being taken off, thus causing damage to the cans as well as the sliver. When the Chinese mill man strips the cards, this is done all in one line at the same time. It is a well known fact that the weight of the sliver is different before and after stripping. After stripping the sliver should be run for a while before being put in the can. But generally they don't. While the cards are running, just before stripping, the attendant opens the doors and often something drops down and spoils the card clothing. Brushes on each end of the flats are very seldom taken off and cleaned, thus causing the ends of the flats to look dirty and become covered with oily waste. One time, while grinding the card, a fitter put his ear near the wire, listening for the sounds, and unfortunately his old felt hat dropped down between the cylinder and doffer, causing the machine to stop. The worst part for him was he was fined for ten days' wages. In Tientsin, during the extremely dry weather, both edges of the web often refuse to go with the rest of the calender rolls. In most mills stripping is done every three hours. For 10s and 16s yarn, the general settings are: Cylinder to doffer, 7; licker-in to cylinder, 10; flat to cylinder, 10; feed plate to licker-in, 10; stripping comb, 17; front and back plates, 22-29, etc. The weight of sliver for various counts are: for 10s, 65 to 67 grains, 16s, 65 grains; 20s, 60 grains, etc. These are taken from actual practice.

Drawing frames of American make, as a rule, are all equipped with metallic rolls. They are made with from four to six deliveries per head. The speed assigned is about 350 r. p. m., but in some cases 500 is used to meet mill conditions.

In many mills, after the arrival of the drawing frames, some workmen, believing the hole in the trumpets too small, have drilled bigger holes. In one mill the heavier weights are put on the front rolls and lighter ones on the back, as the mill superintendent, not being a Chinese, believes this is the right way.

Very few mills have a third process of drawing. In visiting a new mill the writer noticed that the stop-motions had been taken off, but it wasn't nice to tell the manager about it. Once in a while, when the stop motions are working some drawing frame tenders will be seen holding the handles firmly to keep the machines running without looking to see if any sliver at the back was broken off.

As has been said, all the mills in China are spinning low counts, from 10s to 20s, but occasionally 32s may be spun. In any case the trumpets are used for all, regardless of whether it may be exactly right in size or not, so long as yarn is produced. Most mills never think of buying various sizes of trumpets. Lately some mills have had the drawing frames equipped with a revolving clearer with stripping comb complete. This new device is much liked by our workmen. Sometimes it is hard to teach tenders to pick out waste from the top clearers of the old style and very seldom do they remove the cloth from around them. Generally most mills have their lay-out so arranged that the machinery is divided into so many units; that is, so many drawing frames for so many slubbers, etc. Cans for the first or second drawings are painted with red or white with so many lines indicating the process. In this way cans are very seldom mixed up.

From this process on the tenders, generally, are girls or women, while the card and picker tenders are men in all cases.

The following gives some particulars about the fly frames. Slubbers, 80 spindles each, 10 x 5 bobbin, speed around 350 r. p. m.; intermediates, 120 spindles each, 10 x 4½ bobbin, speed around 400 r. p. m.; fine roving frames, 160 spindles each, 7 x 3½ bobbin, speed around 420 r. p. m. These are subject to change to meet mill conditions. The following are the hank-rovings used for the various counts.

Slubber	Intermediates	Roving Frames
10s..... .46	10s..... .95	10s.....1.80
14s.... .55	14s.....1.16	14s.....2.50
16s..... .56	16s.....1.18	16s.....2.75

As the fiber of Chinese cotton is short, the standard number for twist is 1.5 to 1.6. A woman or a girl attends to one frame. The most common breakages on the fly frames are the bolsters. On an average from five to eight bolsters are broken in a 10,000-spindle mill per month. The causes are due to the falling down of bobbins from the creels, or the leather rolls fall down while the machine is running. After the mill has been running for a couple of years or so all the "gap" gears are worn out, which causes bad tapers on the finished bobbins. When the roving at the back creel runs out, the tenders piece ends up by putting two pieces of roving together with a foot or two double in length which causes many yards of uneven yarn in the spinning. When an end breaks in the front, instead of taking the roving from the bobbin to connect with that on the front roll, the tenders in most cases take a piece of roving connecting that in the front roll and then wind that around the bobbin many times without really twisting them together, which, when unwinding in the spinning creel, will break off.

A few mills pay by the hank. In the first place, it requires more clerical work; second, it is difficult to catch tenders cheating by turning the hank-clock, if they find a chance to break the hank clock glass or celluloid. And in the third place, when the bobbins are full, they turn the

cone belt back a little until the bobbins become bigger than the required size with both the tapers tangled. During the rainy season, which may last sometimes as long as eight weeks, especially in Shanghai and its neighborhood, roving on the fine roving frames is wound tight and breaks often, causing frequent stoppage, which in turn makes a shortage of roving for the spinning frames. A change of the tension gear with a difference of even four teeth frequently cannot remedy all the trouble. If the roving is put around the presser fingers only once, it gives the result, but the bobbins will be too soft and will cause considerable waste in the spinning room. White powder is put at various places where the roving touches, and loosening the cone belt a little helps a little bit, but not much. Would any reader give some ideas concerning this?

Spinning frames sent to China from America are made with 288, 304, and 320 spindles per frame, while the British makes contain more spindles per frame; but the latter are not very suitable for the Chinese girl spinners. In almost all mills, a boy or girl takes care of one side of a frame. It is found that 160 spindles per side are a little too many for a small spinner.

During the last three years almost all the frames that have come from America are tape-driven, while the older ones and the British makes use of the band drive. The latter ones are with the double cylinders. The speed of the cylinder is around 1,000 r. p. m.; with a spindle speed around 7,500 to 8,500 r. p. m., and a front roll speed of between 130 and 200 r. p. m., depending on the yarn being spun. The speed of the cylinder is not very even, the frame pulley and motor pulley are of the same size on different frames, but the paper pulley on the motors wears out from time to time. The writer has seen a mill after running two years and a half with all its motor paper-pulleys worn out from a half to one inch in diameter. And in some mills the crowns on the pulley have been ground off by the non-technical men in the mill, and consequently the belts often overlap one another unless an iron ring is placed between the two belts.

The creel on the spinning frame is for single roving, and if a mill wishes to spin 32s or 42s with American cotton, the double creel has to be made. It has been found that it doesn't pay, nor produce any benefit, to spin low counts from double roving. The amount of twist put in the yarn is not important here as the twist change gears are changed some times many times a day. If yarn is spinning well, a twist gear with one or two more teeth is put on, or vice versa. Numerous breakage of spindles is a very common difficulty. Yarn is often twisted on the spindle due to the carelessness of spinners, and it takes great strength to pull the bobbin out, thus bending the spindle.

As the fiber of Chinese cotton is so short, there should be some new device or improvement made on spinning frames to suit such staple. At present the diameter of the rings used is usually 1¾-inches while some Japanese mills use 1-inch or 1¼-inch in diameter. Some suggest the bobbins should be bigger on the bottom and gradually taper at the top. The thread guide board should be lowered in order to reduce the centrifugal force of the yarn after doffing. The number of breakages after each doffing is from 10 to 20 ends on each side. Any means that can remedy such evils will certainly pay. Some claim that the angle of the thread guide is too large as the yarn nearly touches it when the first few layers are wound on the bobbins immediately after doffing, as the ballooning is larger at this time. Most mills do not turn up their rings after being used for years. One can readily see how such rings affect the production. British travelers wear out rings quicker as the quality of the steel is different from that of the steel in the rings, but the former can be obtained in the market here and besides the price is cheaper. Steel bottom rolls are scratched with iron hooks by spinners on account of the roving rolled on it. If brass hooks, which are softer, were used, it would remedy this evil to some extent.

The diameter of the rolls is about the same length as the fiber of the cotton to be spun. Chinese cotton is on an average ¾-inch or less, so that the front and back rolls are made ⅞-inch and the middle ¾-inch. Cylinder bearings are often worn out due to the fact that the tape-pulley is put between two spindle bases by the little spinners. The head doffer bumps the gear end of the frame to call the doffer's attention before doffing. This bad practice, as some claim, has been handed down by Englishmen to Chinese workers while the latter were in their mills. The whistle is now used by most mills instead.

The daily production of 16s yarn in 24 hours in well managed mills is about 1.1 pounds; in poorly managed mills it is around .7 pound. The breaking strength of the various counts of yarn is as follows: 10s, around 100 pounds; 12s, around 90 pounds; 16s around 70 pounds; and 20s, around 60 pounds.

All yarns are reeled and baled before going to the yarn market. Hand reeling machines are commonly used, although power driven ones are sometimes used, which generally run too fast for the eyes of the reelers. A bale consists of 40 small bundles which contain ten or more pounds of yarn. Some mills make a half-bale or small bale of 200 or more pounds.

The trade mark has another meaning besides its own. A bale of 400 pounds is only the nominal weight. One mill may pack 410 pounds per bale, another may use 420 pounds or still another may put in 430 pounds per bale, which constitutes the "trade mark." The size of the yarn is seldom exactly right. A 16s yarn may actually be 15s or 14s yarn. Some mills in Shanghai make their yarns shorter and the weight heavier. In trade mark label such phrases as this are often found, "Extra weight and extra length." It takes more than 470 pounds of cotton to make a bale of so-called 400 pounds in some mills on account of the "extra" business. For this reason, and because of the grade of cotton used, and the mixing and quality of the yarn produced, the price per bale between two mills may differ ten dollars or so. The difference in price between two trade marks of yarn is more or less fixed by the yarn dealers' association, which in turn depend on the demands from the yarn consumers. Yarn is twisted either right hand twist or left hand twist, depending upon the popular demand in different localities. Warp yarn is spun in every mill.

Belting and oiling are two interesting items in considering Chinese mill practice. Mills under British influence, in most cases, have their belts with the flesh side on the pulley. In some mills dry rosin is used as belt-dressing, which sticks on the edges of the pulley. Brushes made of card-clothing are used to "brush" off oil or foreign matter on the belts, which is believed to make them run better. Loosening of belts and pouring oil on them to make them

run slack are other tricks played by some spinners in order to make the work run easier. The price of belting here is about 30 cents Mex. per inch-foot. A piece of belt used on a spinning frame costs about $30.00. It won't be surprising if at some near future date the chain-drive comes into popular demand.

The total cost of oil for a 10,000-spindle mill per year is about $2,500 Mex. Most mill men do not know what kind of oil is correct for the machinery, while the oil companies here do not employ men who know much about oiling, especially about the oiling of textile machinery at any rate, and consequently lots of blunders have been committed by one party or another, blaming one another for the fault. A mill uses thick black oil for shafting as it is said to be recommended by the oil engineer of an oil company. Thick oil is used on the comb-box on the cards. It has been found that there is a difference in temperature of ten or more degrees between thick and thin or spindle oil in the comb-box. Oiling on spinning frames is done every seven or ten days of 24 working hours. The amount of oil used is about seven pounds per 10,000 spindles per month. The expense of these two items in the poorly managed mills is double this.

It is now time that many Chinese mills learn the words "efficiency" and "good management," as they have had a hard time during the last few months. The "survival-of-the-fittest" theory is now working here. Many poorly managed mills are losing many dollars per bale of yarn produced, while the well managed ones are making the same amount. Many mill men are talking much and loudly about Japanese efficiency in their mills, as the latter put the right men in the right place; that's all there is to it. Unlike those in the Chinese mills, where the square pegs usually go in the round holes. Many mills either previously or even now do not employ technical men; they consider they can get along without one as any workman can run machinery. Lately a so-called mechanical department, which takes care of the machinery end, etc., and is composed of trained men, has been developed, following the Japanese methods. It is true the Japanese mills pay more for their laborers or fitters than the Chinese, as the former employ a few picked men under efficient management. They have capital, they learn the language of this country, and they know their business better—these qualities have been and will be great contributions to their success in cotton manufacturing in China. Many mills under the management of other nationalities, instead of hiring laborers directly, make labor contracts for so much per pound of yarn produced with a labor-head or compradore, which constitutes a so-called "slavery system." The poor workmen under this arrangement have no place to complain nor to receive reward for their good work. In such a case the mill itself takes care of the machinery end. No matter in what way the mill is managed, however, if it is managed honestly and efficiently, the cotton mill industry has been and will be a great, profitable, money-making business in China.

The human element in the Chinese mills means a great deal. In every department there are many salaried men—called clerks or overseers—who take care of their respective departments. In mills where such men have power or can absolutely control over all walks of workmen, the mills are nine out of ten successful. It is regretful to say that in most mills, except the few whose managers know anything about their business, the "Number One" men have the whole say and the manager has nothing to say concerning the working conditions inside the mill. When a new man goes to an old mill his first qualification is that he be a good mixer, or in other words, he must be able to know how to handle those "Number One" men and overseers. Otherwise, no matter how well educated or experienced he may be, he will soon find out that he doesn't "feel at home." A well known cotton mill owner once said: "Three great qualities make a good, all-around man in any Chinese cotton mill; they are experience, energy and diplomacy." Cooperation is a great asset, and mill managers are willing to sacrifice anything but this. High positions in mills are considered semi-official, and it is hard for outsiders to get in, except those run in a strictly business manner, which are limited in number. The workmen as a whole cannot hold any responsible position in the mills as they are bound to have some "gaps" in their thinking process. Many mill managers have realized their mills have been controlled by a gang of workmen, but they are afraid to say anything to or do anything with them.

How the labor is handled and controlled should be interesting. When a new mill is started, the manager or the one holding the high position in the mill gets hold of the labor-head or so-called "Chief Number One," whose duty is equivalent to that of chief engineer. This "Chief Number One," man hires all the "Number Ones" in the various departments, the fitters, mechanics, section hands, and possibly includes women "Number Ones," in the spinning room, who in turn hire all the little boy and girl spinners. This method works all right as long as they are left alone. The moment any authority touches any important personage in this gang, a big explosion may follow immediately. The writer heard the story of a mill where a different frame had a different draft change gear on it. Somebody asked the mill man why that should be allowed. The reply was "We are afraid of the explosion." That is, a general strike. In a mill a section hand had been discharged and the next day many spinning frames had to stop because they were short of spinners. Why? All those spinners had been hired by that section hand.

When there is an important affair occurring in the family of a member of an important labor gang, such as a wedding, a birthday celebration, etc., as many as fifty spinners participate in the enjoyment and consequently many frames have to stop. It is also true in case of heavy raining during the time of changing shifts. This is not so common in the Tientsin mills where the laborers are easier to control, and they live in the mill compounds in the majority of cases. Some mills retain ten per cent of the workmen's pay monthly, and others keep two weeks behind as part of their security. If the workers have done anything unreasonable, such as stealing, fighting, doing serious damage to the mills, etc., their security may be forfeited, partly or wholly, depending on the nature of the case.

Labor organizations are steadily on the increase during recent years, especially in Shanghai, where some mill overseers have joined. There have been many strikes in Japanese and British mills around Shanghai during the last few years. The strikes may be due to a demand for higher wages or by discharging the labor head.

When a workman in a Chinese mill is injured, he receives a pension or pay from the mill, but he must work if he can. As a whole they are very peaceful and reasonable if they know they are getting a square deal. They have

proved in many foreign industries that they are industrious and good mechanics, but they should be guided and directed by intelligent leaders. They hate to have a man higher up bawl them out in front of everybody if they have done something wrong. Many foreigners either employed by the mills or sent by the machinery manufacturers have made a mess of things with the workmen because they did not know how to handle them. Many American superintendents are needed to train them, provided they know human nature in addition to their practical experience. After a quarrel with each other, the Chinese generally have a tea-party and then forget and forgive what has passed. This indeed shows the Chinese minds inside out.

Chinese mills produce only coarse yarns to supply home demands, and America need not be afraid of her being a competitor on this line of goods. If the Chinese do not start more mills, the Japanese will, as they are either removing old mills or starting new ones as quickly as they can. China needs American brands and American brains. The former's progress means the latter's prosperity. During the last few years America has installed nearly one million spindles in various parts of China and it is hoped that such progress will continue in the future. China doesn't only need American machinery, but she needs American mill supplies, raw materials, textile goods of all kinds as time goes on. Our mill managers, as well as our workmen, like American machinery because of its simplicity, durability and modernity, and their familiarity with it. It has been clearly shown there is no such thing as a Chinese puzzle in cotton mills or elsewhere. We should learn, study and know each other more and better in order that the puzzle business may disappear.

The Banding of Spindles

BY THE AUTHOR OF "SPINDLE SELECTION AND CARE."

PART TWO.

Reversing the Bands.

In the reversing of bands when changing the direction of rotation of spindles, care must be exercised in getting the bands out of the whirls. An indifferent person can break off—so it sometimes seems—one-half of the bands without effort; accordingly, it should be seen to that the banders are provided with a short-nosed hook that will not stretch the bands to the breaking point when pulling them off.

That the reversing be done with dispatch, a thorough understanding of what to do is essential. How sad to see section-hands, and second-hands, putter around, wondering which band to cut off, often cutting off some on both sides of the frame, and eventually winding up with the one thing they had been endeavoring to avoid—rubbing bands.

Looking at X, Fig. A, it will be noticed that here the rotation is in the direction of the hands of a clock as one looks down at the spindles. It will further be noted that the driving side of the band is always in a straight line regardless of the side of the frame. For instance, the driving side in the sketch X is on the left side of the observer as he faces the cylinders, whether he stands on this or on that side of the frame. Bands 1-2-3-4-5 have the driving side running under the cylinder; whereas a-b-c-d-e have it running over the cylinder.

A study of the sketch X also shows (these statements can be verified by checking them on any spinning or twisting machine) that the part of the band making contact with the cylinder is always to one side of the spindle—and always the driving side. Now, it is quite apparent that if the bands were simply reversed on their respective spindles they would run together, try to ride each other, as depicted in Fig. B, where bands (1) and (a) have been thus reversed. To get around this obstacle is a simple matter, once the mind grasps the idea of the thing. Only one band on each cylinder section need be cut off. In X Fig. A, it would be band (1). Band (2), would be turned over and brought (See Y, Fig. A) to thespindle formerly encompassed by band (1). Similarly with 3-4-5 and so forth. On the other side of the frame it is necessary only to turn the bands—they go back on the same spindles. Simple enough, is it not?

And yet much confusion results from ignorance of which band to cut. A band could just as well be cut on the other side of the frame; but in that case it would have to be the band (e)—if that is the end one. In short, the band cut off in the particular change noted must be the band on the extreme left of the cylinder section when one faces the cylinders. The side of the frame one happens to be on is immaterial.

If, however, the spindles run counter-clockwise, and the bands are as in Fig. C, before reversing, the band on the extreme right, as one faces the cylinders, must be cut. It may perhaps be of help in band reversing to remember this: cut off the band on the extreme end of the cylinder section—right or left as the case may require—and then move every band on this side of the frame to the next spindle—right or left again, as the case may be. On the other side, it must be borne in mind, only the reversing need be done—the bands go back on the same spindles. When the bands are all back again in the spindle whirls, the cylinder should be turned several times so that the bands may run into their proper places. After the frame is started, the bander should band all spindles minus bands. Furthermore, the bands should always be immediately tested for slackness after a reversing, because there is usually more or less strain on the bands as they are yanked in and out of the whirls.

Somewhat similar to the procedure in reversing bands is that employed in handling the bands when a cylinder is to be removed. As before, the bands are hooked off the whirls, but in the case of a cylinder removal, the bands are entirely disconnected from the spindle and left hanging from the cylinder. They are then gathered together in a bundle and suspended from the dashboard. All this is easy. The bothersome part comes later when the bands are spread out along the cylinder preparatory to being placed on the spindles again.

Two persons should be entrusted with this important phase of the work, one on each side of the frame, each taking a band in turn and hooking it over the upper part

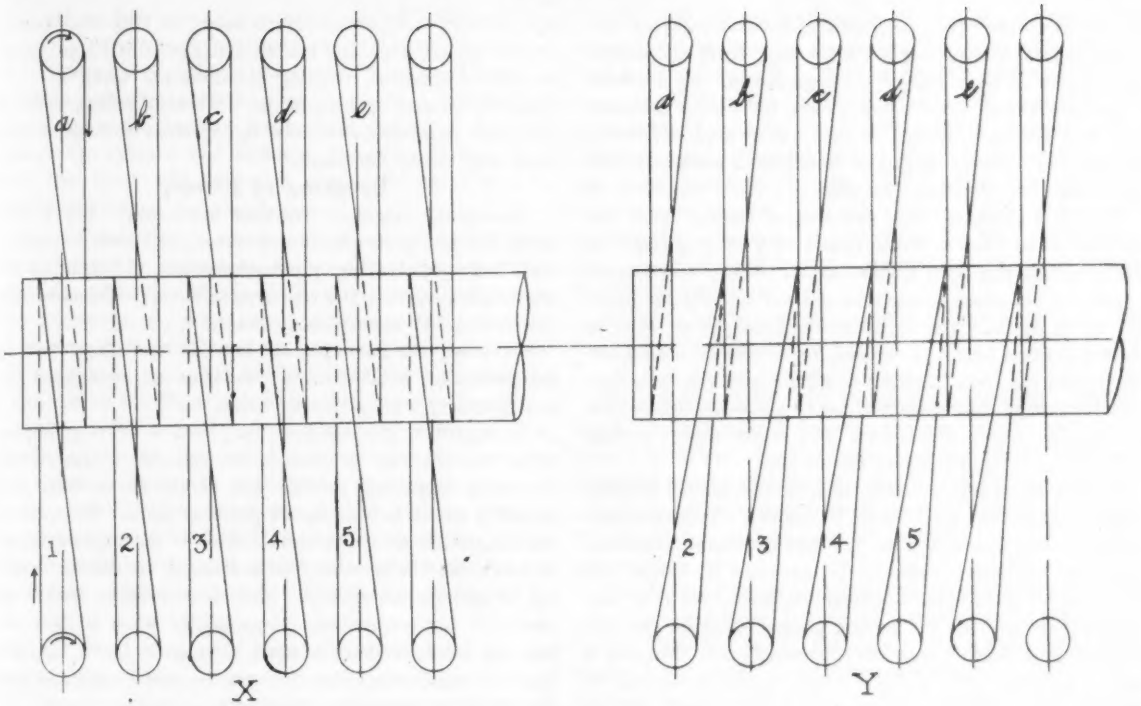

FIG. A

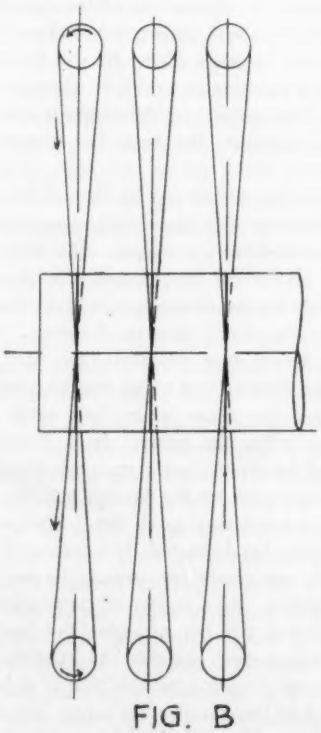

FIG. B

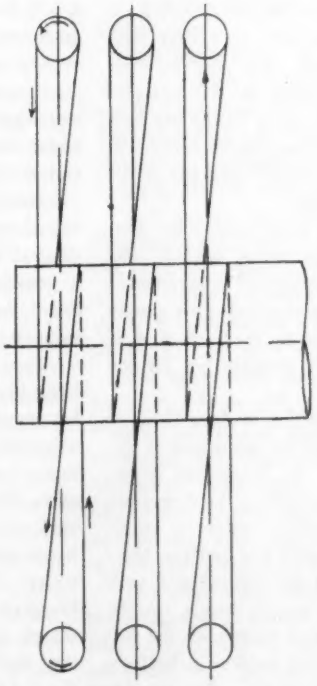

FIG. C

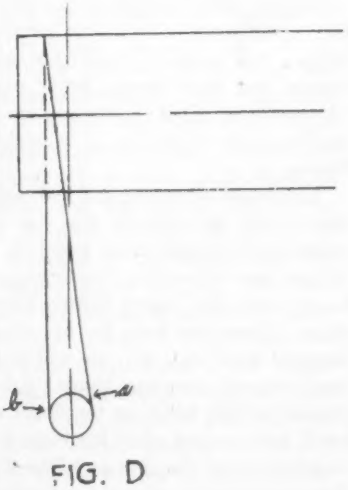

FIG. D

of the spindle base. After the bands are thus placed, they are hooked into the whirls. Here is where many a band meets its Waterloo if the job is not intelligently done. The hook should be used first on the side where the band is highest, so that the final sweep of its movement terminates at a point lower than that of its inception. For instance, in Fig. D, the arrow (a) indicates the starting point; the arrow (b), the finishing point. There is less danger of unduly stretching the bands by this method.

Testing for Slackness.

Mills seeking a perfect product must reduce their slack twisted work. Slack affects the appearance and also the strength of the goods. For this reason some method of eliminating the slack bands must be devised. A good plan

is to go over the bands periodically, the frequency of this proceeding depending upon fluctuations from the allowable number of slack bands—a set minimum. An increase in the slack bands would indicate more testings; a decrease, less. Too frequent testings, it need not be said, are better than too few. Better by far, 20 tests with 2 slacks cut off, than 5 tests and 15 bobbins spoiled!

The most practical way, perhaps, of testing bands for slackness is to press a finger against the whirl jacket. A little practice will soon enable one to become very expert in picking out those bands that are not driving the spindles up to speed. The forefinger is usually used; but to prevent friction burns, the second finger may be used alternately with the first. Testing a spindle with the first, then with the second finger enables one to go over a whole side or frame with little discomfort. For tender fingers a strip of leather or similar padding can be used.

It is well to try the twist occasionally on the bobbins before a suspected slack band is cut off. Indiscriminate cutting is detrimental to a 100 per cent production schedule; therefore, while it is essential to eliminate all bands that fail to drive their spindles up to the mark, yet it is just as important to limit the cutting process to those that are actually thus derelict, not only seemingly so. Nursing a band —as it may be called—is sometimes advantageous, especially if good band-tiers are scarce, or if bands are already flying off like autumn leaves.

Slack bands can sometimes be detected by the eye on account of vibration; and, very slack bands, or bands whose strands are beginning to break, will often be detected on full bobbins because these bobbins revolve so slowly that attention cannot but be drawn to them. The yarn on such bobbins, moreover, is soft and yielding to the grasp—another slack telltale. As a matter of fact, bands are best tested on full bobbins, for the load it then has to carry will often show up a slack band when it would perhaps never have been discovered on a small bobbin.

Greasy bands will sometimes slip even though the tension is sufficient to drive the spindles under normal conditions. Old bands fall under the category of greasy bands because they have become fairly impregnated with grease oil, rust, etc. Such bands are slimy to the feel, and if handled leave a residue of brownish composition on the fingers.

The knack of cutting off and removing a slack band so that it will not entangle with one of its neighbors is acquired only through much practice. To think that it can be done just by reading directions, explicit as these may be, is on a par with taking a correspondence course in swimming. Those who have the opportunity for putting their acquired knowledge into use will find the following a very good way of removing bands: lightweight bands can be grasped at the whirl by forefinger and thumb of the left hand, and stopped while the right hand holding a knife is thrust over the ring-rail and into the frame. The band is then cut with one quick upward movement of the blade; or, the knife may be used close to the fingers that hold the band, the blade being pushed downward to sever the band. In both cases, just as soon as the band is cut, the left hand, gripping the band firmly, as it does, between forefinger and thumb, is drawn back with a rapid movement to prevent the band catching in the adjoining bands.

Slack yarn may be brought about by causes other than loose bands; and one therefore needs be sure that bands are not cut off when the real trouble lies with vibrating or featherless spindles. Faulty spindle-blade locks are occasionally sources of loose bands. Workers poking brushes and other implements between the spindles will sometimes break and loosen the bands.

Breaking of Bands.

Among the causes of breaking bands are: (1) faulty knot; (2) faulty stretching apparatus; (3) faulty spindle-blade lock; (4) cleaning spindle-blade lock; (5) cleaning between spindles, etc.; (6) oiling spindles; (7) defective cylinders, and (8) atmospheric changes.

Of these, the most prolific are (1) and (8); that is, for premature breakages. Instructions as to making the knot properly were given in Part 1.

In regard to atmospheric changes, it is of vital importance that attention be given to the humidity of the rooms. If this is neglected, trouble will surely ensue when the humidity climbs beyond the 60 per cent mark. To counteract the shrinkage of the bands which is the biggest factor in breakages due to atmospheric changes, the bands should not be put on too tightly. Such a proceeding makes no provision for contraction; consequently when it does occur, the band breaks. A good plan is to insist that the bands be tied on so that they can be readily slipped into the whirls by means of a forefinger.

Where there is no automatic internal control of the humidity, windows play a significant part in the management of the atmospheric conditions. If notice be taken, it will be found that when the rooms, say of the doubling department, are very warm, about 85 degrees, Fahrenheit, or so; when the humidity is going 60 to 65 per cent or stronger; and the bands are falling like soldiers when charging a machine gun, that the opening of the windows a little wider will nearly always reduce the heat, the humidity, and the band breakage.

That atmospheric changes affect the bands will be admitted by any one who has to stay in a room after closing time at night when the windows are closed. The snap of a breaking band here and there can be quite frequently heard, and if these bands are examined they will be found to have ruptured at one side of and close to, the knot.

As a rule, breaking bands drop directly to the floor, or hang to some part of the frame from which they can easily be removed. But there are times when they catch on neighboring bands, entangling the latter. It is desirable that a band so entangled be expeditiously removed, because, quite often, the band entangled by the broken one will be held stationary. Such a band may catch fire. When this happens, the smoldering band should be immersed in water. Bands thus held stationary can usually be smelled long before they are sighted. As a matter of precaution, a search should be instituted for the offender the instant that the burning odor makes itself evident. Another reason for the immediate removal of such a band is that if it happens to stop over a joint of the cylinder, the solder will melt on account of the heat engendered by the friction between the band and the cylinder. The result is a cylinder job!

Old bands that break and then catch and lap around a bobbin usually soil the product on this bobbin. Not only is the product soiled, but it is also occasionally tangled. In both cases, usually, waste is made either in running off the soiled part, or when fixing the snarled ends.

Breaking bands sometimes catch around cylinder bearings, and, rarely though, around the jackgear brackets of old style machines. In the latter case, if the band happens to get into the teeth of the gear, it means a frameful of ends to piece up, because the wedging action of the band between the cylinder and jackgear, forces the latter out of mesh, the front roll thereupon stops, the ends twist to a snarling tightness and then break.

Frayed ends from a new band that has broken and then become caught on a revolving bobbin will sometimes get on half a side of bobbins if the air is circulating at that place. Such extraneous fly waste, as it is, incorporating itself in the yarn spoils the quality of the latter and must be run off. A fraying band can often be detected from some distance on account of the fibers rising cloudlike over the frame.

Broken bands should not be left lying on the floor in the alleys, because they get tangled around the axles of truck wheels. Better to throw them underneath the machinery, leaving them there for the sweeper to remove. The reclamation of the best of the broken bands may sometimes be worth while; and such bands may be utilized on winders, and similar machinery with a low spindle speed.

Summarizing.

Much of the success of banding hinges on the ability of an overseer to make his second and section-hands see the light. Every section-hand whether he has been brought up in the room or has come from outside should understand the principles of banding; furthermore, he should be able to tie on bands himself, and, what is particularly important, properly instruct others.

In addition, the advantage of a truly square knot, the effect of changing atmosphere, the danger to the bands from careless workers who brush between or around the spindles, the possibility of injury to bands from improperly adjusted spindle-blade locks, the risk of stretching if not actually breaking the bands when oiling spindles—all these things should be an indelible part of a section-man's make-up, and must always be in the foreground of his consciousness. Thus he learns to quickly ascertain the reason for any excessive breaking of the bands, and can take or suggest measures to remedy the same.

The bander should be carefully selected; he must above all be receptive to the instruction given him. If he isn't, change banders; for a bander who will not follow instructions is as a wrench in the smooth running organization-gears of a mill. Executives who have given their banding problem even a little attention will concede that there is a vast difference in the fitness of the persons who are initiated into the banding. However, this variation in the capabilities of banders could be cut down to a point where any person of average intelligence could do the work properly, if he can be persuaded to follow directions and if he has competent and alert supervisors to whom he can turn when in trouble. A careless fellow who despite all he has been told pulls up his bands as tight as he possibly can get them, who ties a granny as often as a square knot, who like as not pulls his square knots out of square by yanking and sawing on the tails—such a chap will always be in hot water with the bands even if he works like the proverbial beaver.

Under ordinary conditions a bander should be able to tie on an average of 50 bands an hour without discomfort; and under stress, he should manage 60 to 70 in a spurt of an hour or so.

The life of bands depends on many conditions; the quanity of the material composing them; the way they are put on; the knot that is tied; the speed that they run; and the abuse they receive through defective cylinders and spindle-blade locks, or from workers while cleaning. Size, too, has a large bearing on the longevity of bands; given the same conditions, 40s will usually outlive 30s. The load they carry also enters into the matter. Three months may perhaps be a fair average for 25s to 45s banding, running at a speed of 2200 feet per minute, and carrying a yarn load of 2 to 3 ounces.

(This is the second of a series of two articles on the banding of spindles.)

The Dodge Sales and Engineering Company, Mishawaka, Indiana, which has for the past eight years been operating as the selling subsidiary of the Dodge Manufacturing Company and Dodge Steel Pulley Corporation, has now been consolidated with the parent company, Dodge Manufacturing Corporation, which was organized and began business last July.

The Dodge Manufacturing Corporation at that time took over the two long established manufacturing concerns, Dodge Manufacturing Company organized in 1880 and Dodge Steel Pulley Corporation organized in 1917 as the successor of the Oneida Steel Pulley Company which began the manufacture of steel pulleys in 1900.

Since July 1922 the manufacture of Dodge, Oneida and Keystone power transmission appliances and Dodge Heavy Oil Engines has been conducted by Dodge Manufacturing Corporation.

The distribution of Dodge products, which has heretofore been done under the name of Dodge Sales and Engineering Company, will hereafter be conducted by the sales department of the Dodge Manufacturing Corporation with Duncan J. Campbell, general sales manager, in charge and John A. Beyon, assistant general sales manager.

The district sales organization of the Dodge Sales and Engineering Company will be continued as branches of the sales department of the Dodge Manufacturing Corporation. Their activities will be considerably increased and the service to dealer and consumer from branch warehouse stocks will be kept up to a high standard of efficiency.

The advertising department of the Dodge Manufacturing Corporation will be under the direction of William W. French, advertising manager, and the activities of this department will include a complete program of dealer cooperation. The entire resources of this department will be at the disposal of dealers for developing local campaigns on Dodge products and extensive plans are under way for direct-by-mail and other forms of dealer helps.

The Dodge Manufacturing Corporation is the largest manufacturer of power transmitting appliances in the world and is equipped to furnish stock products such as iron, steel and wood pulleys, pillow blocks, hangers, etc., as well as complete rope drives, fly-wheels and water wheel harness especially designed and constructed to meet the requirements of every industry.

Distribution of Dodge products is made through fourteen branch warehouses in power using centers, as well as hundreds of representative mill suppliers and jobbers.

The Dodge Manufacturing Corporation also controls the Dodge Manufacturing Company of Canada, Ltd., with head offies and works at Toronto, Ontario and sales office at Montreal, Que.

The Design and Manufacture of Fustians

BY T. WOODHOUSE AND A. BRAND.

The velvet cutting machines made according to Keighley and Netherwood's patents are stated to be able to cut the following lengths of cloth in 10 hours:

	One knife machine	Four knife machine
Constitutions	500 yards	800 yards
Genoas	400 yards	600 yards
Eight Shafts (Harness)	240 yards	400 yards
Thicksets	200 yards	320 yards

It is quite possible that at the present time even these productions might be exceeded.

The one-knife machine is illustrated in Fig. 63 which gives a general indication of the appearance of the mechanism; it will be observed that the method of cutting is very similar to that illustrated in Fig. 61. Fig. 64 illustrates a somewhat similar machine but provided with four knives so that four races may be cut at one run through. As already mentioned, it is very essential that the knives should be accurately set in order that each one may enter midway between the floats to be cut.

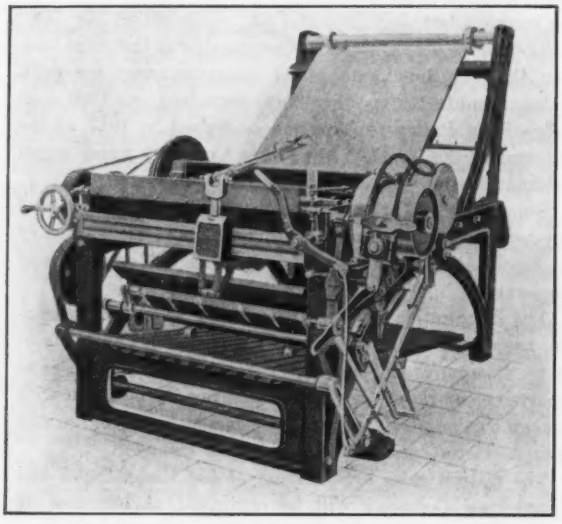

FIG. 63

The positions of the cutting knives vary in the two machines illustrated in Figs. 63 and 64, for whereas the single knife in Fig. 63 enters the race where the cloth is passing obliquely to the rollers, the knives in Fig. 64 are nearly horizontal. The action of each knife in the four-knife machine shown in Fig. 64 will be understood by referring to Fig. 65, which is a sectional elevation as viewed from the pulley side of the machine. The upper part of the end frame is lettered *A*, while the piece of cloth marked *B* is first passed over and under the two lower tension rails *C*, then upwards and threaded amongst the upper tension rails C_1, then down the oblique boards and under the first guide roller, after which it passes to a card covered feed roller *D*, partially round the two lower guide rollers and then behind and over the top of the so-called back rail *E*. A steady feed is thus secured, and the cloth *B* is presented without creases to the semi-circular face of the above-mentioned back rail. The cloth *B* is then passed over the tension roller *F*, which revolves rapidly, and between it and an endless sheet *Q* kept taut by the jockey cylinder *T*, the lever *U* and the spiral spring *V*. Finally the cloth is passed partially around the rollers *R* and *R*, and taken down to a scray near the floor to be joined to the opposite end of the piece to make it, as it were, endless. When the cloth *B* has been introduced as explained, the four knife-holders *b* with their cutting ends *a* are placed in position and the operation is commenced immediately the knives have been accurately adjusted for the races. In the longitudinal center of the semi-circular back rail *E* is a screwed rod which carries four projecting curves or swells *G* which coincide in position with the cutting knives and adapted to tighten the fabric slightly at the four places so that the cutting may be effective. After four races have been cut along the full length of the piece, the swells *G* are moved laterally through a distance equal to the pitch of the races by means of the blocks *I* on the screwed rod and wheel gearing not shown. The four knife blocks, shown clearly at the front of the machine in Fig. 64, are also moved laterally so that the cutting ends *a* of the knives *b* may be entered into the adjoining uncut races ready for another run through. Automatic stop motions cause the knives to turn over if they penetrate the cloth and simultaneously stop the moving cloth.

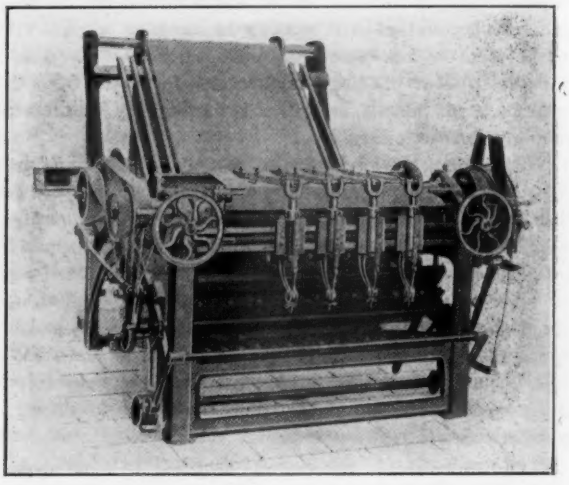

FIG. 64

Two processes of cutting weft pile fabrics have now been described, and these are the usual methods. The hand process, at its very best, is slow, and the use of a machine greatly increases the production, although it may not make such a satisfactory pile as is possible by expert manual work. Recent attempts to increase the production still more have been made, and these involve the cutting of the pile in the loom simultaneously with the weaving operation; this, when satisfactorily performed, obviates the necessity for a separate and distinct cutting process, but it is bound to complicate the mechanism of the loom. The principle of cutting in the loom is as well-known, regularly applied in connection with several types of warp pile

fabrics, but it is only in comparatively recent times that the principle has been more or less successfully applied to the cutting of weft pile fabrics.

Looms adapted for the weaving of warp pile textures require, in many cases, a wiring motion to insert and to withdraw the pile forming and cutting wires; such looms have the disadvantage of occupying about twice the normal floor space, and sometimes considerably more than this. Except for double plush weaving, and certain types of carpets, a wiring motion may be regarded as practically essential for the production of such fabrics, but when the pile is to be formed by filling or weft, entirely different mechanism must be adopted. There is no question of imitation or substitution; the two types of fabric are quite distinct and a weft pile fabric can be made quite as satisfactory as a warp pile fabric.

In a recent American (U. S. A.) patent pile loom, a series of wires, one for each pile tuft in the width of the fabric, is passed through the openings or dents of the reed along with the warp threads. Each wire is in two parts, pivotally connected with each other. The inner part, which is two to three times as long as the outer part, is also pivotally connected to one of a series of wire heddles (harnesses) situated immediately at the back of the lay or slay. As the heddle or harness rises and falls, the inner part of the wire can be lifted or depressed in exactly the same manner as an ordinary warp thread. The outer part of the wire remains parallel to the warp threads in the woven fabric, and carries a sharp cutting projection on its upper face near its outer end; this part also acts as a guide to the float of filling or weft as it gradually advances towards the cutting edge during the operation of weaving. The outer ends of the wires are carried in a guide rail which receives a reciprocating motion from an eccentric on the crankshaft of the loom, through a system of levers. The cutting part of the wire is thus made to move a small distance backwards and forwards each pick, and this greatly facilitates the severing action. It will be understood that the wire heddles may be under the control of a jacquard if desired, and that loops can thus be formed at will in order to produce any required pattern. When the cut fabric is removed from the loom, it is ready for the finishing operations of steaming, brushing, trimming, etc., similar to those given to an ordinary hand or machine cut cloth.

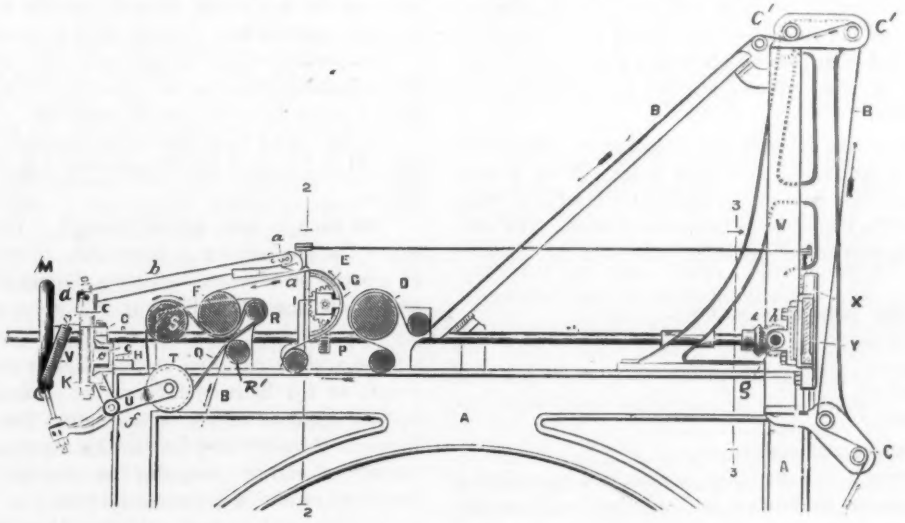

FIG. 65

It is interesting to know that fustian cutting by hand is a comparatively ancient art. An Act of Parliament was introduced in England in 1494, A. D. to provide penalties for malpractices which unscrupulous craftsmen had introduced into the trade.

The art, like other arts, has also produced its bard, but its importance is not to be inferred from the quality of its minstrelsy. There is on record an old song, written and sung about 130 years ago, by a Mr. Errington, an actor at The Theatre Royal, Manchester. The song contains a large number of punning allusions to fustian cutting, and it can well be believed that apart from its merits or demerits as a poem, it acquired a certain degree of popularity amongst the Manchester fustian cutters. A few verses by way of illustration are given herewith, as printed in an interesting brochure published by Messrs. Henry Bannerman & Sons, Ltd., Manchester:

"When Adam kept house in the Garden of Eden,
"His wife and himself nought but fruit had to feed on,
"The fig tree alone was their wardrobe we're told,
"No pockets they needed for silver or gold.

"No cash they e'er wanted, no creditors knew,
"Whatever they wished for around them it grew,
"Their clothes knew no *cutting,* their food ne'er felt *knife,*
"Without thought of either they jogg'd on through life.

"From that time to this, sir, has altered the case,
"Now *cutting's* the game for food, clothing, and place,
"'Tis *cut* as *cut can,* all the world through we see,
"But who *cuts so fairly,* yet as constant as we?

"Six days out of seven, from morning 'till night,
"For a *living* we *cut;* who can say we're not right?
"Though many *cross cuts* in this life we may find,
"The *long cut straight forward's* the *cut* to my mind.

"One neighbour, his neighbour may *cut* out of place,
"Such *cutting* can't honestly look in the face;
"The gamester the cards he may *cut* to himself,
"Tho' the stake he receives, 'tis but ill-gotten pelf.

"Long may *fustian cutters,* in sweet harmony,
"United, work on, when the merchants agree;
"No strife or contentions arise to appal,
" 'Till Death, that sly *cutter,* shall *cut* for us all."

Finishing.

The finishing of fustians, including the operation of cutting as described in previous pages, is an extremely involved series of operations. The exact routine adopted varies with the type and quality of the fabric, but the operations have for their chief objects the following:

1. The efficient raising of the cut pile.
2. The rendering of this pile more or less permanent and stable, and
3. The obtaining of the polish or luster which is a characteristic feature of these fabrics, the best examples of which combine in the highest degree the attributes of beauty and utility.

It is not intended to enter into the full ramifications of this part of the subject—which would really require a volume in itself—but to conclude with a description in general of the finishing process applied to velveteens as a typical fustian.

The whole of the finishing processes may be conveniently grouped into six stages. The first is the cutting process, which in some ways may be regarded as the most important; at any rate it is the most characteristic process. The other five stages appear under the chief process in the following list:

1. Cutting (already described).
2. Preparatory.
3. Dressing.
4. Bleaching.
5. Dyeing.
6. Finishing and making-up.

Preparatory. The cut fabric is examined by a class of operatives known as "enders and menders." Their duty is the discovery and repair of any damage which the fabric may have sustained during the operation of cutting. These operatives become very skillful in their work through time, and it is extremely difficult to detect in a finished piece of cloth any evidence of their attentions. In this respect, they perform similar functions to that done by fine cloth drawers in the woolen trade and the menders in the same trade.

The stiffening matter introduced into the fabrics at the sizing machine, and immediately prior to cutting, is next removed from the cloth in order to render it soft and pliable by a process of soaking or scouring. The cloth is first passed through hot water, and then through cold water. The cold water may contain a small percentage of malt or of diastaphor (often spelled diastafor) about one to two pounds per 100 gallons of water. This treatment converts the starchy matters into sugars, which are readily soluble in water. In some works it is usual to steep such fabrics as velveteens and corduroys for about two days in such a malt solution contained in a large cistern. The whole is then brought slowly to boiling point and boiled for six to eight hours; the liquor is continuously circulated through the cistern either by a pump or by a steam injector, and on the completion of the boiling, the goods are allowed to lie overnight to cool thoroughly. Whichever routine is followed, the fabric is usually delivered in the folded or plaited-down condition.

The purification of the fabric from starchy material is completed by a thorough washing in a washing machine, preferably of the open-width type. Hot water is used, and the cloth is delivered into a barrow.

The superfluous moisture is now removed from the wet cloth by placing the latter in the cage of a hydro-extractor of special form. In all these operations great care is taken in the handling and treatment of the fabric in order that the pile may not be damaged by crushing. For example, the cloth is not simply thrown into the cage of the hydro-extractor, but is wound in the open width on a drum, and bands are used to keep it in position. A 36-inch diameter cage will hold an average dry weight of 55 pounds of cloth, and about five charges may be made per hour. The hydro-extractor runs at about 1,100 revolutions per minute, and takes about 3 h. p. to drive. If electrically driven, the current used is approximately 12 amps. at 220 volts or the equivalent thereof, but the starting current naturally exceeds this, and may be 2 to 3 times as much.

The partially-dried fabric is now fully dried in a chamber containing steam-heated cylinders, from which it is delivered in the folded or plaited condition.

On delivering from the drying chamber, the pieces are weighed and marked for identification and commercial purposes.

The cloth is now passed through a brushing machine where the pile surface is thoroughly raised by the action of a series of brushes. All loose fibrous filaments are removed, and the pile is filled up into a compact dense-looking mass.

The surface resulting at this stage is still more or less rough, as the individual fibers and threads forming the tufts, are not all of the same length. The surface of the fabric is therefore now levelled by a passage of the cloth through a cutting, cropping or shearing machine; this treatment results in a dense, level pile.

The material is now subjected to a second brushing operation which completes the preparatory processes.

Dressing. The first operation is that of singeing to complete the removal of the "nap." This is effected either by gas singeing or by plate singeing; the former process which is the more thorough of the two, is usually employed for cords, while the latter is most common for velveteens.

In the usual type of gas singeing machines the cloth is passed through a series of wooden tension bars, and afterwards through a long bunsen flame. If required, the fabric may be passed through two flames, one above the other, and so arranged as to act upon each side. In either case, the cloth is passed immediately into a water box in order that it may be cooled and any sparks extinguished; afterwards it is plaited down in a loose condition in the usual manner. The burners are of special construction; the gas and the necessary air for combustion are mixed in a chamber, and supplied to the burners by a rotary blower or by a pump. The speed of operation varies from about 150 yards to 200 yards per minute. An 80-inch wide machine can deal with two or three pieces side by side, depending on the width of the cloth; it will consume about four h. p. and will burn about 160 cubic feet of gas per hour.

Plate singeing machines are provided with one or two curved plates made from copper between one inch and two inches thick. These are heated to bright redness by a coal or coke-fired furnace below; occasionally the fuel used is

crude petroleum which has the advantage of giving more uniform heat. The cloth speed is not less than 160 yards per minute. An automatic motion is provided which causes the cloth gradually to alter its surface of contact with the plates; this serves the double purpose of preventing local cooling of the plates, and of assuring that almost the whole of the heated surface is brought into action. A machine with an oil-fired furnace can run at speeds up to 200 yards per minute, and requires about 4 h. p. Apart from the actual singeing apparatus, the machine is identical in principle with the gas singeing type.

When the singeing process is complete, the fabric is dried and subjected to a third passage through the brushing machine. It is now examined carefully to see that the standards of quality are being maintained, and if passed as correct, the material is now regarded as being in the "dressed-off" state, and is ready for the hands of the bleacher.

Bleaching. Generally speaking, the bleaching operation is similar in most respects to that employed for the great bulk of ordinary cotton piece goods. The actual extent to which the process is carried depends upon the color to which the bleached fabric is to be dyed. The lighter and more delicate the color is to be, the higher degree of whiteness is the bleach. The sequence of operations may be summarized somewhat as follows:

1. Boiled in a weak solution of soda-ash, i. e., soda or commercial sodium carbonate.
2. Washed in the open width.
3. Soured in a weak solution of sulphuric acid (oil of vitriol).
4. Washed as in (2).
5. Chemicked with chloride of lime (calcium hypochlorite or bleaching powder).
6. Washed as in (2).
7. Soured in a weak solution of sulphuric acid.
8. Washed for the last time as in (2).
9. Hydro-extracted, and
10. Dried.

The fabric is now in the "ashed, soured, and washed-off" condition, and is ready for the attention of the dyer.

Dyeing. The dyeing operation is usually carried out in a jigger, and does not differ materially from the usual process applied to ordinary cotton piece-goods. The substantive dyes are commonly used, although the sulphide dyestuffs are preferred where fastness is a desideratum. Bright colors are almost invariably produced with the aid of basic dyestuffs. Even when it is necessary to use direct or sulphide dyes in order to produce the required color, it is a common practice to brighten the tones thus obtained by topping with a small amount of basic dyestuff in a fresh liquor acidified with acetic acid. In the case of pile fabrics, it is usual to add to the dye-bath, for all shades, from ½ to 1 gramme of soda per litre. In addition, there are graded additions of Turkey-red oil according to the depth of shade desired; light shades require 1 to 2 grms., medium shades 2 to 3 grms., and dark shades 5 to 10 grms. per litre.

Immediately after the dyeing operation, the fabric, instead of being squeezed in the usual manner is passed into a second jigger, and subjected to a thorough spraying with water, after which it is hydro-extracted and dried.

If the color shade is found correct, the fabric is now ready for the last sequence of operations.

Finishing and Making-up. The dyed fabric is first passed into a machine containing, say, four rollers of bees-wax, stearine, etc., where the pile is waxed in order, among other reasons, to prevent the color from being stripped. It is now brushed in order to raise the pile, to work the wax into the fibrous tufts composing the pile, and to add luster and polish to the fabric.

The fabric is again waxed and passed into the peg-finishing machine, where the pile is subjected to light firm strokes from a hardwood strip working across the width of the fabric. This stroking operation further increases the luster of the pile, but tends somewhat to flatten the tufts, so that the fabric is again brushed to raise the tufts. This is the last mechanical operation to which the fabric is usually subjected.

For the higher class fabrics, a further manual operation is required in order to give the last finishing touches to the development of the pile. The cloth is laid on perfectly flat stone tables, while the operative carefully inspects it, and removes all blemishes with the aid of a hand peg and hand brush.

This completes the finishing operation. The fabric is plaited and folded, and taken to the inspection table where it passes the scrutiny of one or more responsible officials. After this inspection, each piece is measured and made-up, ready for the retail trade, in the form in which it will ultimately come before the consumer.

(This concludes the series on fustian manufacturing by Mr. Woodhouse. Another interesting series on the design and manufacture of towels is now being prepared and will begin in an early number.—The Editor.)

The firm of B. B. & R. Knight, Inc., held a banquet for the officials of the company and the overseers and second hands of all their mills, on Monday night, December 18, 1922, at Natick, R. I. Over 200 persons were present. G. Edward Buxton, vice president, presided as toastmaster, and music was rendered by the orchestra of the Royal Mills, of River Point, R. I. Among those who spoke were Mr. Pearce, the new president of the corporation; F. L. Branson, general manager; Mr. McNully of the welfare department of the American Woolen Company; and Mr. Hicks, assistant to the president of the Standard Oil Company of New Jersey.

Mr. McNully gave a very spirited address on the human factor in industry, and his remarks were enthusiastically received by the audience. Mr. Hicks gave a splendid outline of what the Standard Oil Company is doing along the lines of industrial democracy and how greatly the morale of the workers has increased thereby.

Morse Chain Company, of Ithaca, N. Y., has constructed a new factory in Detroit, Mich. The building, providing a total manufacturing area of 60,000 square feet, is one-story, of re-inforced concrete construction, and is the first unit of a group planned by the company. The new plant was built particularly in accordance with a rapidly increasing demand for Morse silent chain front end drives for automobile use.

An organization, like an individual, can acquire the habit of doing things ahead of time.—*E. M. Statler.*

Humidity in Cotton Mills

BY J. WILKINSON.

Relative Humidity.

The amount of water vapor present in air may vary within very considerable limits, thus at 32 degrees or freezing point, one cubic foot of air may take up and contain as a maximum quantity 2.0 grains of water; at 50 degrees, 4 grains of water; at 68 degrees 7.4 grains of water, and at 86 degrees, 13.1 grains. For any given temperature there is a maximum amount of water vapor which any given amount of air may take up, and the amounts stated are the maximum quantities for the temperatures given. Under these conditions the air is said to be saturated with water vapor at the particular temperature given, or in other words, the relative humidity is 100 per cent.

Now if the temperature of air saturated with water vapor is raised it will no longer be saturated, and evaporation will take place from all moist surfaces, water passing into the state of vapor and increasing the amount of water vapor in the air. Thus, if one cubic foot of air is saturated with water vapor at 32 degrees, each cubic foot of air will contain two grains by weight of water as vapor. If the temperature is raised to 50 degrees, without altering the amount of water vapor, the relative humidity will be diminished to 50 per cent, as at this temperature the air may contain four grains as a maximum and with only two grains present the air will be only half saturated. The relative humidity is obtained thus: Amount of water in air at temperature $t^{\circ} \times 100 \div$ the maximum amount required to saturate the air at t°.

If instead of raising the temperature, the air saturated with water vapor is lowered in temperature, moisture will be deposited either as mist, dew or rain. Thus air saturated at 50 degrees will contain four grains of water per cubic foot and if the temperature falls to 32 degrees, two grains of water will be deposited as liquid water, this being the difference in the amount required to saturate the air at 50 degrees and 32 degrees.

The temperature at which the deposition of liquid water begins is termed the "dew point." If the air is saturated with water vapor at any time, its temperature will be the dew point at that time, but if it is not saturated, that is, if the relative humidity is below 100 per cent, then the air must be cooled till it arrives at that temperature at which the relative humidity is 100 per cent. At this point the air is saturated with vapor, and any further cooling must result in the deposition of liquid water. This temperature is the *dew point* for the particular conditions at that time. It follows that if the air is far from being saturated, a considerable lowering of the temperature is necessary before it will deposit moisture, that is, before it arrives at the dew point.

The deposition of dew through the lowering of the temperature of the air may be illustrated by pouring water, cooled with ice, into a jug or glass tumbler. The glass will become rapidly dimmed on the outside, due to the cooling of the surrounding adjacent air to its saturation point or "dew point" so that any further cooling then results in the deposition of liquid water on the cold surface of the glass. The wet and dry bulb thermometer is the hygrometer almost universally used for determining the hygrometric state of the air and though it does not give the actual dew point, the latter can be easily calculated from the reading of the instrument.

This hygrometer measures the capacity of the air to take up water vapor and the further the temperature of the atmosphere is from the saturation point or dew point the greater will this capacity be. When a liquid passes into vapor heat is absorbed and this may be illustrated by the rapid evaporation of ether. If air is blown through ether in a glass vessel, such as a tumbler, standing on the wet block of wood, the cold which is produced will freeze the glass to the wood. With the wet and dry bulb thermometer a similar action is taking place on the wet bulb. The dry bulb thermometer is an ordinary one for registering the air temperature, while the wet bulb thermometer has its bulb covered with muslin which is kept moist by means of a connecting thread or wick, dipping into water. If the air is saturated with water vapor, no water will evaporate from the muslin, and there will be no loss of heat. The wet thermometer therefore will register the same temperature as the dry one, and this will be the dew point. If the air is, however, unsaturated, the air around the muslin covered bulb will take up moisture. The evaporation of water from the moist muslin will bring about the absorption of heat from the bulb, and the temperature of the wet bulb thermometer will fall. It, therefore, always shows a lower temperature than the dry bulb in an unsaturated atmosphere, and the drier the atmosphere the greater will be the difference between the two readings.

It will thus be obvious how important it is to keep the wet bulb thermometer supplied with water, as the hygrometer is useless if the water vessel becomes dry. The actual readings of the two thermometers are serviceable for obtaining either the dew point or the relative humidity.

To find the relative humidity, dew point, and absolute amount of grains of water vapor in the atmosphere at any time, there is an interesting apparatus called the hygrodeik, which is an improved form of hygrometer. This consists of two thermometers, wet and dry bulb, mounted upon the outer edge of a chart plotted from standard wet and dry bulbs. To find the relative humidity the index hand to the left of the chart is swung, the sliding pointer is then adjusted to that degree of the wet bulb thermometer scale at which the mercury stands. Then the index hand is swung to the right, until the sliding pointer intersects the curved line which extends downward to the left from the degree of the dry bulb thermometer scale indexed by the top of the mercury column in the dry bulb tube. At this intersection the index hand will point to the relative humidity on the scale at the bottom of the chart.

To find the dew point and absolute amount of grains of water vapor observe the intersection as above, and follow the curved line through it which runs from the top downward to the right to the point of contact with the dry bulb scale. The degree (53) at this point on the scale is the dew point required. The figure at the upper end of this line will give the absolute amount of water in grains (4.5 grains) per cubic foot of air.

(Note—It might be well to mention here the Sling Psychrometer, which is conceded to be more accurate in its results than the Hygrometer, although requiring a little more time and skill to handle. The Hygrometer, being suspended in the room all the time, is subject to accumulation of dirt and fungi on the wick—not to consider the possible deficit of water already mentioned. These conditions tend toward a decrease in the depression registered and consequently faulty readings. Such a faulty reading always shows a higher relative humidity than actually exists.—Editor.)

A great many people are not yet clear upon this question of relative humidity and its effect upon the weaving of cotton cloth, and very few people are aware that a damp or humid atmosphere may be made into a dry one by heating it. In order to make this matter clearer the following table should be carefully examined:

TABLE SHOWING EFFECT OF HEATING A SATURATED ATMOSPHERE FROM 33 DEGREES F. TO 70 DEGREES F.

	Temperature	Relative Humidity	Grains of Moisture Per Cubic Foot.	Grains of Moisture Per Cubic Foot Required to Raise the Relative Humidity to 82 Per Cent.
Outside Air	33 F.	100	2.2	
Same air heated to	38 F.	83	2.2	
Same air heated to	44 F.	65	2.2	0.6
Same air heated to	49 F.	55	2.2	1.1
Same air heated to	54 F.	47	2.2	1.7
Same air heated to	60 F.	37	2.2	2.5
Same air heated to	65 F.	32	2.2	3.4
Same air heated to	70 F.	27	2.2	4.4

As a further illustration take a weave room 150 feet square and 15 feet high. The air of such a room, saturated with moisture at 32 degrees F., would contain the vapor of 11½ gallons of water and would feel very damp. If the temperature of this air were raised to 65 degrees F., and no further moisture added, the air would then feel excessively dry. From what has already been said it will be seen that the apparent dryness or dampness of an atmosphere depends not only on the absolute amount of water vapor present, but upon the temperature also. In the example above, a saturated atmosphere at 65 degrees F., would hold the vapor of 33 gallons of water as against 11½ gallons at 32 degrees F.

It is therefore evident that a cold atmosphere may be more humid or moist, with very little actual moisture, than a warm atmosphere which may contain a very much greater quantity of moisture. In other words, the humidity or moistness of an atmosphere depends not upon the absolute weight of water vapor in it but upon the degree of saturation. Therefore, if cold air be admitted to a weave room, the temperature of which is 65 degrees F., and if this air be not humidified, the following conditions would be produced.

The cold air, whatever its condition of humidity, would rise in temperature, and would then be capable of absorbing a much greater quantity of moisture than before. This would have the effect of drying the air in the room, although it would still contain the same actual weight of moisture. The dry air would then begin to absorb moisture from the yarn, and this would have disastrous effects on the weaving.

While dealing with this question of humidity it may be as well to explain clearly why east winds and cold frosty days make weaving bad. East winds are generally set down as cold, whereas as a matter of fact they may be no colder than west winds. What is really the case is that they are dry and cause a sensation of coldness on account of robbeing the surface of the body of moisture. The rapid evaporation of moisture (as shown by the wet bulb) cools the surface of the body and produces a feeling of coldness. The same thing occurs when the dry air is forced into the weaving room. It absorbs moisture as soon as it enters the room and so robs the cotton of its natural moisture.

Similar conditions arise in cold frosty weather. As soon as the air enters the mill it becomes warmer and then robs the fiber of its moisture.

While dealing with the question of relative humidity it might be as well to show by some comparison what is meant by the terms "damp" and "dry:"

Air containing 90 to 100 per cent relative humidity is very damp.

Air containing 80 to 90 per cent humidity is damp.

Air containing 70 to 80 per cent relative humidity is neither damp nor dry.

Air containing 60 to 70 per cent relative humidity is dry.

Air containing 50 to 60 per cent relative humidity is very dry.

The average relative humidity of the outside air is 75 to 80 per cent.

From these explanations it must be apparent to the average reader that in order to carry on the business of cotton manufacturing the air of the mill must be conditioned in order to keep it at the regular temperature and the consequent regular state of humidity to produce results in both quantity and quality.

The accompanying table shows the maximum limits of humidity of the atmosphere at given temperatures:

Grains of Vapor Per Cubic Foot of air.	Dry Bulb Thermometer Degrees Fahrenheit.	Wet Bulb Thermometer Degrees Fahrenheit.	Percentage of Humidity Saturation = 100 Per cent.
1.9	35	33	80
2.4	40	38	84
2.9	45	43	85
3.5	50	48	86
4.2	55	53	87
5.1	60	58	88
6.0	65	63	88
7.1	70	68	88
7.65	75	71.5	81.5
8.55	80	75.5	77.5
9.2	85	79	72
10.3	90	83	69
11.5	95	87	66
12.7	100	91	64

Air at a temperature of 32 degrees F., and at complete saturation, can hold only 2.1 grains of water vapor per

cubic foot. As long as the incoming air is of a low temperature, or of a temperature equal to that of the water used in the humidifier, the air in passing through a sheet of water does not absorb any moisture, and the relative humidity of the air remains as before passing through the water. But if the temperature of the air is greater than that of the water, then evaporation takes place, and the relative humidity of the incoming air increases. The real cleaning of the air is attained by the attraction of the moisture for the dust particles. The washing effect of the descending drops is only an incident in the process. The cloud particles of vapor permeate the space in which they are and the rain drops are relatively few and far between. Clouds of spray from the humidifying boxes offer an enormous cooling surface to the warm air, and exercise a remarkable refrigerating effect upon it suitable for reducing the temperature of spinning rooms in hot weather and for purifying the air in dirty weather, as it creates both the cloud and the rain drops.

Some people fail to understand how it is that the question of humidifying should be dealt with in conjunction with that of ventilating. The following facts, however, will make this clearer to them. When natural ventilation is employed in summer to reduce the temperature, the air has to be admitted into the room in a very dry condition, for on the warmest portion of a summer day the humidity is always comparatively low. Should there be even a very slight wind this will cause quite a variation in the distribution of the air in different parts of the mill. The air coming in, in this manner, must be moistened after it enters the mill. Later in the summer, doors, windows and roof ventilators are opened for cooling purposes (which should never be allowed) but the effect of this means of ventilation is greatly lessened in summer by the smaller difference in temperatures within and without. While natural ventilation is *never* suitable for spinning fine yarns, artificial ventilation can be so supplied as to overcome all the objections to natural ventilation, and to maintain a constant volume of pure air supply properly and evenly humidified regardless of the state of the weather. Therefore, to be really and thoroughly effective, humidifying and ventilating must always go together. On this subject, generally speaking, it may be said that many of the failures in artificially conditioning textile mills have been due to a disregard of the peculiar circumstances affecting the humidity of the mill. One set of conditions exists during the cold weather, while an entirely different set is encountered in dry, hot weather. An apparatus, to be entirely successful, must meet both these cases equally well. In designing a humidifying system attention must be given to the needs of each particular case. An apparatus that will work admirably in an empty room, or in a spooling or weave room, may prove quite useless under the exacting conditions of the spinning room; and again, a system may be thoroughly successful in the spinning room in winter and yet quite a failure there in the hot summer weather.

The great amount of heat generated by textile machinery in the summer is a matter which has to be primarily borne in mind, for practically all of the large amount of power used in driving the machinery is finally converted into its equivalent of heat inside the building. In proof of this it may be said that temperatures have been observed in spinning rooms 40 degrees above the outside air, with windows, doors and ventilators closed, and where there was no other source of heat than the power absorbed by the machinery.

The effect of this rise in temperature is disastrous to the natural humidity in the room, for the higher the temperature the larger is the moisture deficiency, and therefore the lower the percentage of humidity. Accordingly the relation between temperature and humidity is very close. The greater the rise in temperature the more moisture must be added, hence the greater difficulty in humidifying the room.

The heat that is generated by the machinery in the mill must be eliminated either by natural or artificial means. There are but three ways of doing this: natural radiation, natural or artificial ventilation, and artificial evaporation.

The amount of heat disposed of through radiation depends on the difference in temperature inside and outside the mill. The greater portion of the heat is thus disposed of during the winter weather, while in fine summer weather it must be taken care of through ventilation. There is always some natural ventilation or infiltration in the mill even with all its doors and windows closed. The amount of this infiltration is estimated by experts to be equal to about one change of air per hour in the building during cold winter weather, and disposes of about one half as much heat as radiation. It is owing to this natural infiltration going on in the building that it is impossible to humidify a building and to keep it humidified without a continual addition of moisture. Of course all textile mills must be ventilated in summer or the operatives could not work. The higher the temperature the greater the amount of moisture necessary to maintain a given percentage of humidity. Accordingly, if ventilation were not resorted to, an enormous number of water vapor sprays would be required.

Natural ventilation is much more satisfactory in winter than in summer. In winter only a small volume of air need be introduced, which, though very dry, is easily humidified, but in summer the heat of the machinery must be borne in mind and provided for by very rapid ventilation. The large amount of unconditioned air thus introduced must be humidifed after entering the mill. This not only needs the introduction of a great amount of moisture but makes it practically impossible to secure uniform conditions, since the entering dry air settles along the floor, and near the windows, while the moist, warm air goes out through the ventilators.

Cooling by the evaporation of a water spray is an effective means of absorbing the heat generated in a room, as it accomplishes both cooling and humidifying in the one operation. In cooling by evaporation approximately 1.050 heat units are absorbed by every pound of moisture evaporated. One pound of moisture evaporated per minute would therefore dispose of the heat generated by 25 horsepower of machinery. Evaporation and ventilation are interdependent; ventilation is necessary to secure evaporation. The maximum amount of moisture a cubic foot of air will hold depends upon the temperature. Air at 60 degrees F. cannot hold more than 5.8 grains per cubic foot; at 65 degrees F., 6. 8 grains; at 70 degrees, 8 grains, etc. Therefore, evaporation can take place only when the air in the room, or at the humidifying apparatus, is below the point of saturation. In order to insure a cooling effect by evaporation, an amount of air must be introduced into the room sufficient to evaporate and to absorb the moisture.

In winter when the air is cold and dry, a very much smaller quantity of air is needed to obtain a condition of saturation in absorbing the moisture than is necessary in summer, when the air is moist and hot.

To cool the spinning room in summer, when ring spindles are employed, and at the same time to keep up 70 per cent humidity, it is necessary for the air in the room to be changed once every five or ten minutes, depending upon the horsepower developed per cubic foot of space. Lower percentages of humidity need relatively lower air changes.

The air change is needed if the heat is to be effectively cleared away, whether by natural or artificial ventilation, and whether humidifying the air before or after it is admitted to the mill. With fine yarns many experts maintain it is impossible to secure a sufficient amount of natural ventilation to cool the spinning room in hot weather, on account of the disastrous effect of fluctuating window drafts upon fine counts.

There are several methods by which the air may be satisfactorily distributed through the rooms of a cotton mill. The method adapted will depend entirely on individual conditions, such as architectural design, size of mill, number of floors, arrangement of departments, and on whether the mill is old or new. There are two principles of ventilation combined with humidifying, viz., the natural or extraction principle, and the pressure or plenum principle, and as stated at the beginning of this article, at the present time the plenum principle is the one advocated by most ventilating engineers and in this verdict the writer most heartily concurs.

(This is the second of a series of two articles on this subject.—The Editor.)

What the Southern Mills Are Doing

There are now current so many rumors of new plants that will be erected, extensive additions and improvements that will be made, and eastern corporations that have representatives surveying the possibilities for or that have already definitely announced large textile investments in the southern section, that these features, passed by numerous press dispatches and by word of mouth, easily predominate any report of the activities of the southern mill industry at the present time.

During the month just passing, to borrow an expression from today's radio page in the newspaper, the ether has been seething with announcements and rumors of announcements of expansion and development work in the southern territory, which seems to mark the veritable dawn of that new era of progress and development everyone has been looking for.

In addition to the prospects of further construction and enlargement, it is noteworthy that the industry practically as a whole is operating in good order, with a large percentage of the plants on twenty-four hour schedules and the others comfortably supplied with orders to keep them busy.

Whether or no all our cotton is going to be used up after a while, the fact is self-evident from visits to sections of the industry and reports from sales representatives, that southern cotton mills as a whole seem to be operating on a substantial, satisfactory basis and expected, as they replaced the 1922 calendars with the pretty ones received during the holiday season, that these would be taken down following a twelve-month period that would be very pleasant to remember.

One of the outstanding announcements was that made to the effect that the Appleton Company, now operating a large plant at Lowell, Mass., will construct a 115,000-spindle mill and finishing plant somewhere in the southern section. D. D. Little, president of the Clinchfield Manufacturing Co., at Marion, N. C., will be the treasurer of the new organization, and has been given the duty of selecting a site for the establishment of the plant. Forest City, N. C., was designated as "correspondence headquarters," but in an interview Mr. Little stated that the location of the mill at that point was not to be implied. "If possible," he said, "I want to find a location that will enable me to build a modern manufacturing plant separate and distinct from any town or plant now in existence, and I will name the town either Appleton, S. C., or Appleton, N. C." J. E. Sirrine & Company, Greenville, S. C., have been engaged as engineers for consultation in the selection of the location.

William S. Brayton, treasurer of the Sagamore Manufacturing Company, of Fall River, Mass., announced early in January that his company was considering the purchase of a southern mill as an adjunct to the Fall River plant. He stated that the corporation was considering two plants of 50,000 spindles each, located within 30 miles of Charlotte, N. C., and that one of these probably would be secured.

Dunlop Tire & Rubber Corporation, operating mills in the east for the manufacture of cords for automobile tires, are contemplating the location of textile mill units in southern territory also. J. J. Boyle, an official of the corporation, during January was on a trip through the South inspecting a number of mill centers for this purpose. L. W. (Chip) Robert, of Robert & Company, who are the consulting engineers for the Dunlop interests in America, accompanied Mr. Boyle on this tour. Columbus, and West Point, Ga., Gastonia, and Charlotte, N. C., and Greenville, S. C., were among the centers visited.

It was announced that the plans of the Dunlop organization call for two additional 80,000-spindle units for the production of tire cords, in addition to the ones now operating in Utica and Buffalo, N. Y. The definite location of these plants had not been settled, and it was with the probability in view of establishing these in the South that Mr. Boyle's tour through the section was made.

A number of other New England organizations are surveying the prospects of the South for further development, but the reports of these are still in a nebular or indefinite state, and while no specific details can be given at this time, the next few weeks may be expected to reveal several other definite actions in building up the industry in the southern section. An interesting announcement during the past month was that the Jenckes Spinning Co., of Pawtucket, R. I., had made definite plans for the removal of the machinery from their plant at Central Falls, R. I., to Gastonia, N. C., where the corporation already operates the Loray Mills.

In South Carolina, the Watts Mills, at Laurens, announced plans for a new building program which provides for the erection of a new cloth room, of brick construction 78 x 100 feet, to be built by the side of the slasher room. A 16-room hotel will also be built, as well as 12 new four-room cottages. The hotel will be a frame structure, equipped with all modern conveniences.

Organization of a new company at Laurens for the operation of a weaving mill has been announced. This will be the Palmetto Manufacturing Company, and will manufacture fancy print goods with an initial equipment of 100 looms. E. D. Easterby and Albert Dial are the promoters of the new mill. The building formerly occupied by the Laurens Box and Crate factory will be utilized for

the new enterprise, only such improvements to this as will be necessary being made. A number of residences will also be constructed for operatives at the plant. Electric power will be used, and the mill will be operated day and night. The capitalization was planned at $75,000.

Republic Cotton Mills, Great Falls, S. C., which are building an extensive addition to house 1,000 new looms, have awarded contract for 215 bungalows, of three, four and six rooms each, to provide for the operatives necessary to operate the new mill. The houses entail a cost of approximately $450,000, and will be modern in every respect.

Work began during the month on 60 new dwellings at the Dunean Mills, Greenville, which will cost about $80,000. The houses are to contain three rooms each, and will be of attractive design.

The Monarch Mills, Union, S. C., are constructing a modern, well equipped school building, to supplement the present equipment which has become inadequate to care for the needs of the village.

Extensive improvements at the Musgrove Mills, Gaffney, S. C., have been announced, including 5,000 additional spindles, together with the necessary additional carding machinery and similar equipment allowing the mill's output to be increased by about 25 per cent. The addition to the Musgrove mill also includes ten new 40-inch looms.

Piedmont Manufacturing Co., Piedmont, S. C., have plans for replacing existing equipment with new Model E Draper looms in the basement of one weave room. Other improvements are also being considered at this plant.

The Pelzer (S. C.) Manufacturing Company is to construct a gymnasium for the use of its employees. The building, which will cost about $28,000, will be a two-story structure containing a large swimming pool, a basketball court and complete equipment of all kinds.

A three-story brick addition, 50 x 75 feet, is being erected at the Mary Louise Mill, Cowpens, S. C. It is stated that this new space is being added to give more room and facility for the operation of the plant, and will not mean an increase in spindleage. Another construction work at this place is the building of a 50,000-gallon capacity water tank with fire fighting facilities. The total cost of this improvement will be around $75,000.

The employees of the Victory Yarn Mills, Gastonia, N C., presented their superintendent, H. Gilmer Winget, with a handsome gold Knight Templar watch charm and chain at Christmas as a token of their high regard.

Statesville, N. C., reports that it has received through Hesslein & Co., Inc., of New York, a proposition from an eastern manufacturer who wants to build a mill in that section, assisted by local capital. The matter was presented to the Statesville Chamber of Commerce through J. M. Deaton.

The Red Springs (N. C.) Cotton Mill, who were recently announced as considering the addition of 10,000 spindles, have changed their plans, it is stated, and will probably install looms instead.

An addition of 140 looms is being made at the Erlanger Cotton Mills, Lexington, N. C., it is reported.

North State Cotton Mills, Taylorsville, N. C. have purchased and are installing 5,000 additional spindles.

Norwood Mfg. Co., Norwood, S. C. have purhcased 2,500 additional spindles to be added to their present equipment.

A third mill will be erected by the Bladenboro Cotton Mills, Bladenboro, N. C., it was announced recently. The cost of the new plant is estimated at $400,000, and it will use electric power from the company's central power station. The plant will contain 15,000 spindles for the manufacture of 20s to 30s single and ply yarns. The building will be 100 x 700 feet. Machinery has been purchased from H. & B. American Machine Co., Pawtucket, R. I. R. C. Biberstein, of Charlotte, N. C., is the architect. The officers of the company are: H. C. Bridger, president; R. L. Bridger, vice president; C. O. Bridger, secretary-treasurer and J. L. Bridger, general manager.

Dacotah Cotton Mill, Lexington, N. C. recently purchased 180 acres of land adjoining their present property, from H. E. Tiser, for approximately $15,500. This makes about $70,000 worth of land purchased by this company within the past few months. This mill is also planning for the erection of a brick office building, to be modernly equipped and to cost approximately $20,000, for early occupancy.

The capacity of the No. 2 Mill at the Pee Dee Manufacturing Company, Rockingham, N. C., will be practically doubled, it is stated, the new construction planned including a 125 x 450-foot weave shed for 600 new looms, an addition of 9,000 spindles, a cloth room and a shipping room and several sections of an 80 x 80-foot cotton warehouse. Robert & Company, of Atlanta, Ga., are the engineers.

Wade H. Gray, of Asheville, N. C., has purchased the Brevard Cotton Mill, at Brevard, N. C., and contemplates doubling the size of the plant, according to an announcement. The property was purchased from W. C. Cleveland, of Greenville, S. C., for a price of $100,000, and Mr. Gray assumed ownership on January 1. The mill has 5,000 spindles for manufacturing combed yarn. Mr. Gray recently sold his interests in the W. S. Gray Cotton Mills of Woodruff, S. C., to a Spartanburg syndicate headed by H. A. Ligon. He owns the Spartanburg County Cotton Mills, located near Spartanburg, S. C.

Construction work on the Troutman (N. C.) Cotton Mill has been completed. The mill will manufacture fine combed yarns and R. H. Kale, of the Hall-Kale Mfg. Co., will be manager of the plant.

It is reported that the A. M. Smyre Mfg. Co., Ranlo, N. C., have purchased 10,000 spindles for installation in the new building recently completed by them.

Holt-Williamson Mfg. Co., Fayetteville, N. C., are going to enlarge their mill, it is stated, and Robert & Co., of Atlanta, Ga., are the engineers.

The Center Cotton Mills, Maiden, S. C., have been sold to the Maiden Cotton Mills and are now known as the Maiden Cotton Mills No. 1.

At Goldsboro, N. C., the Borden Mfg. Co., were reported to be adding a vertical opener and 72 deliveries of drawing.

Southern Mercerizing Co., Tryon, N. C., is making improvements to its plant, including the installation of a settling basin and a cotton yarn warehouse. The company is building five additional cottages and enlarging four of the existing residences.

Immediate construction work is planned on the new $100,000 addition to the Cherokee Spinning Mills, Knoxville, Tenn., which will convert the plant into a weaving mill. The new addition will be concrete and steel construction,

two-story, with basement, 183 x 200 feet. Lockwood, Greene & Co., of Boston and Atlanta, are the architects.

The capacity of the Peerless Cotton Mills, Thomaston, Ga., is to be greatly enlarged, according to a report.

Plans are being prepared by Robert & Company, Atlanta, Ga., for extensive additions to the plant and equipment of the Crystal Springs Bleachery Co., Chickamauga, Ga. The chief addition will be a building approximately 150 x 500 feet, two stories high, and other smaller buildings will also be erected.

Mallison Braided Cord Company, Athens, Ga., have completed the rebuilding of the plant destroyed by fire, and have an equipment of 2,104 spindles, seven looms and 130 braiders.

Swift Manufacturing Co., Columbus, Ga., have completed the replacement of 8,000 spindles and will add 110 looms, it is reported.

Star Thread Mills, Athens, Ga., will increase their capacity, involving an expenditure of approximately $50,000.

The Erlanger Cotton Mills, Lexington, N. C., have completed their new cloth room and cloth storage room and are now installing 140 additional 40-inch looms.

Montgomery (Ala.) Cotton Manufacturing Company have increased their loom equipment to 204 and are now manufacturing chambrays exclusively.

The purchase of 250 acres of land by the Merrimack Manufacturing Co., Huntsville, Ala., is reported to presage the erection of an additional cotton mill and the building of another village for operatives. The land recently acquired lies immediately south of the Merrimack village. The original plans of the company when it started its development in the South are said to have provided for the erection of eight large mills and a finishing plant.

It is stated that the Indian Head Mills of Alabama, at Cordova, Ala., are considering the erection of another mill at that place.

Lanett Cotton Mills, Lanett, Ala., will immediately replace the $65,000 schoolhouse recently destroyed by fire, it is reported.

Lincoln Mills of Alabama, it is reported at Huntsville, Ala., where the plant is located, will double their capacity within a short time by the erection of an additional cotton mill.

Extensive improvements are being made by the Wellman Cotton Mills, at Athens, Ala., in the way of replacement of old machinery, etc., as well as the installation of additional machines.

A syndicate headed by J. R. Millar, of Oakland, Calif., recently purchased the Rabell Cotton Mills, at Selma, Ala., for a consideration of approximately $500,000. The mills were purchased from W. T. Bell, who has been operating them for several years, and the name will be changed from the Rabell Cotton Mills to the Sunset Textile Mills. C. K. Taylor, of McComb, Miss., negotiated the sale. Mr. Millar, who heads the syndicate of new owners, is general manager of the California Cotton Mills Company, at Oakland, California, and is also the proprietor of the New Canebrake Cotton Mills, Uniontown, Ala.

Dwight Manufacturing Co., Alabama City, Ala., is repairing and painting 500 houses in its village.

E. C. Wilson, of the Alabama Power Company, reports that he has received inquiries from a large New England textile manufacturer relative to locating a 600-loom textile mill in Selma or vicinity.

Fulton Bag & Cotton Mills have taken bids for the erection of two one-story additions, 65 x 95 feet, and 50 x 85 feet, respectively, at the New Orleans plant, estimated to cost $46,000. The plans also call for alterations and improvements at the existing plant.

Announcement was made during the past month that a new $8,000,000 cotton and wool manufacturing plant will be established near San Francisco, California. The cotton division will be developed first, it is stated, to comprise a unit of 161,000 spindles and 4,000 looms. The main building will be 400 x 700 feet, of fireproof construction. Cotton from the Imperial Valley, California and Arizona will be used. E. W. Tarr, of Gross Valley, California, makes the announcement.

Report from Santa Ana, California, states that R. L. Stewart, of Atlanta, Ga., is organizing a company to establish and operate a cotton mill in Santa Ana. Negotiations were under way for the purchase of the property of the Mission Woolen Mills, Washington, Ave., to be remodeled and equipped for the proposed plant.

The Los Angeles Cotton Mills, Los Angeles, California, have been organized with a capital of $1,000,000 to erect a plant with 10,000 spindles and a proportionate number of looms to produce sheetings, twills, scrim, toweling and canton flannels. The officials of the company are Edward W. Fowler, president; W. H. Whiteside, vice-president; and R. I. Rogers, vice-president of the Merchants' National Bank, treasurer. M. H. Merrill, president of M. H. Merrill & Co., of Boston, is a director.

Texas Cotton Mill Company, McKinney, Texas, have increased their capital stock from $440,000 to $1,200,000, and are adding a new building to the plant, to be 108 x 171 feet.

Laurel Mills, Laurel, Miss., are constructing six new residences for employees which will make a total of 123 houses.

The J. W. Sanders Cotton Mills, Inc., is a new concern at Starkville, Miss, for manufacturing cotton goods. The incorporators are J. W. Sanders, Jackson, Miss.; R. D. Sanders, Kosciusko, Miss., and N. Theston Enewell, Starkville, Miss.

The Western Cotton Products Co., National City, California, recently organized, has purchased the former plant at that place of the Nordof China Products Co. for the establishment of a new cotton mill. The present structure will be remodeled and improved, and other buildings constructed. The machinery to be installed will cost approximately $55,000. B. B. McCall Jr., heads the new organization.

Lowinson's Cotton Goods Chart, covering the year 1922, showing the year's rise and fall in prices of gray cotton goods as well as of spot cotton, has been issued, and anyone affiliated with the cotton goods trade may secure a copy gratis upon application to Louis Lowinson & Co., 72 Leonard St., New York City.

Hubbard Brothers & Co., Hanover Square, New York City, have issued their annual booklet on American cotton crop movements, in which are brought down to date, in the usual convenient form, the various tables of statistics on raw cotton, etc., collated and distributed by this organization in past years.

The New England Mill Situation.

The mills in this section are as active as they can be. Orders in hand are ample to keep them occupied for an average of at least three months, many plants being engaged for the balance of the half year. More machinery could be started in some plants if desirable help were available. Several plants have not yet fully recovered from the strikes of last year, the Amoskeag Company at Manchester, N. H., for example, having only about 13,000 out of a possible 17,000 at work.

The market for the product looks healthy for the next two or three months at least and unsold stocks in mill hands are very trifling. Machine shops are busy. The yarn mills are not running quite as full proportionately as the cloth mills. Some finishing plants are running in full and overtime, while others are about three fourths occupied. The largest bleachers and finishers are busy to capacity. The mills that usually pay a dividend for the first quarter of their fiscal year at this time have been declaring the usual quota. An exception was found in the case of the Amoskeag whose dividend was reduced one half on the ground that it had not been earned during the long period of idle ness due to the strike there. Mill shares as a rule have been showing an increase in salable value.

From these facts it will be seen that the immediate situation is bright enough to suit anyone looking only at surface indications. But there are some other facts that show a most uncertain prospect to many observers and to many investors as well. Leaders of unions centered in New York and directed from the A. F. of L. headquarters in Washington, are fomenting troubles about wages and about further short hour legislation. Bankers and members of chambers of commerce are beginning to take action concertedly to protest against further agitations.

Reports are being constantly published of New England mill investors either going South or advising that no further additions be made to plants established here. It is expected at any time that announcement will be made by the Pacific Mills of Lawrence of their purpose to build a very large bleachery in the South, probably near Spartanburg, S. C., to make better use of the large product of gray cloths turned out by mills the company now own there. The very successful treasurer of the Sagamore mill at Fall River has been looking over some mill plants offered to him in the South at $40 a spindle, minus the quick assets. Authorities connected with the Pepperell mills of Biddeford, Me., have been looking over southern mill properties and sites, with a thought in mind of extending that great plant nearer the cotton fields.

Perhaps half a dozen groups of mill owners have serious plans under consideration for locating additions in the South and devoting the established plants to finer or fancier work than is now done. Some of these plans may never be matured but it is certain that some of them will. It has already been related to what extent the owners of the Appleton mills of Lowell have consummated plans for a 115,000 spindle plant some where in western North Carolina.

It is noted that in some quarters of New England these plans and the wide publicity given to them. are attributed to a desire to check the further progress of restrictive legislation, and fomented labor agitation, and while there is a small element of truth in this view, it by no means lessens the cold fact that many careful cotton mill investors have ceased to look upon the field here as an attractive one for new ventures in large industrial plants of a textile character. The reasons for all this are familiar enough, and can be summed up in restrictive legislation, excessive municipal taxation, short hours and an absence of popular sympathy with textile corporations or their managers.

Despite the gloomy outlook that some manufacturers delight in painting at this time, it is the fact that a change in sentiment is at work throughout New England at this moment. The activity in the mills is awakening what may be termed the middle class of people here, to the advantages of steadily employed workers, on their own fortunes and their own peace of mind.

In Rhode Island, where strenuous efforts are being made to enact a 48-hour law in the legislature now in session, leading bankers have passed a set of resolutions demanding that business people generally cause an investigation to be undertaken into the merits of the question of southern competition before any further restrictive legislation is permitted in the State. Chambers of commerce have responded throughout that State following the suggestions of the bankers, and small independent movements among other people owning homes and small investments are also beginning to rise up, and these people are going to have their say about the impositions of warring capital and labor on their existence.

In New Hampshire, where the hottest sort of a political fight is underway to jam a 48-hour law through the session of the legislature now sitting in that State, farmers' granges and other centers of independent thought are being heard from and a demand is being made that legislators keep their hands off established corporations until further investigations of disputed industrial questions can be made. The house of representatives in that State is overwhelmingly democratic and is forcing short hour legislation, while the Senate, nominally republican, is expected to stand against such legislation at this time. In the State of Maine efforts are being made to force short hour legislation on the books but the farming element is against it and will probably defeat it readily. These things indicate that a more rational sentiment is finally coming to the surface in conservative New England.

Perhaps one of the most significant facts of manufacturing interest is that disclosed at Fall River. In that city, a doffers' union backed by the United Textile Workers of America and the American Federation of Labor has voted to strike, and has been joined by a union of mill firemen. Opposed to this action stands the Textile Council, a body of trades unionists organized for many years and locally directed and controlled. This body has voted not to take up the wage question until March, at least. The manufacturers in a manifesto to citizens, published as an advertisement in the daily papers of the city, have pointed out the reasons they have for absolutely refusing to make any wage concessions such as those demanded by the U. T. W.

The latter organization held its annual convention in the city. It voted to leave the matter of when a strike shall be called, in the hands of its officers. Those officers are now at work on various New England cities and are talking and threatening another big strike for a 29 per cent increase in wages! In the face of this attitude, some of the leading clergymen of the city have begun to preach against the en-

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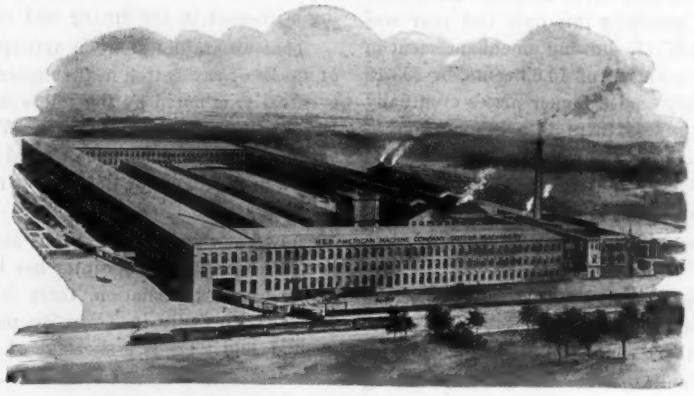

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trance into the community of "industrial disturbers" and it is clearly evident that if a strike is actually called, it will not go far.

It might seem from an enumeration of these elements of doubt and disturbance affecting the textile industry in New England on its financial and social sides, that nothing short of decay is in sight. A conclusion of this character is very far from the truth. Figures published within the past few weeks show that in some of the largest New England textile cities, contributions to churches for maintenance and extensions amount to five per cent of the wages paid in the mills. And these contributions to religious institutions, churches, hospitals, orphanages, Y. M. C. A's. and the like are wholly voluntary.

There are more automobiles owned and operated in some of the large New England textile centers than in cities where mills of any kind do not exist. They are owned by operatives, as well as by others. The daily columns of the newspapers contain advertisements running into four columns a day telling of theatres and other forms of public amusement supported largely by operatives. These are only sidelights on the social conditions, of course, but when it is remembered that the greatest public school systems in the world actually flourish in these same centers, it is unlikely to suppose that decay has set in.

These things can exist and continue to increase side by side with the fact of a very full development of the textile industry in the South, where it is now growing so rapidly. There are some maufacturers in New England who are still unperturbed by the hullaballoo about the migration of an industry so varied and ramified as the cotton industry of New England. It is not a time when much will be heard from them. It is much safer, in trying to arrive at a true view of the New England situation as it stands today, to remember that many of the vexations New England mill men are contending with are being felt more and more in the South, and are fully appreciated by the older men there engaged in the industry.

In many respects the attack that is being made on New England is an alien attack. *It is fomented by those who will go South at any time they are permitted the license that has been tolerated in this section.* As to the real merits of the financial returns in the South as against New England, prudent and experienced manufacturers in both places are very much disposed not to overrate the advantages of one section as against the other for the long pull. It is manifest that for many years to come both sections will thrive in the measure that skill and prudence in manufacturing and merchandising are met by order and thrift among the workers.

A recent issue of a Springfield (Mass.) newspaper carried an extensive story concerning the distribution of $375,000 by the Farr Alpaca Company, of Holyoke, Mass., among its employees. This distribution was made upon a plan adopted in 1915, whereby each operative receives as a bonus a percentage of his yearly wages, the amount being determined by the profits earned by the corporation during the year. The bonus this year was on a 14 per cent basis.

Cotton Comment.

BY H. & B. BEER.

New Orleans, La., January 16th, 1923.

Another two cents advance has taken place during the past month, making a rise in values of six cents per pound, or $30 per bale during the past three months. As a matter of fact the value of middling this date last year was 16. 50, whereas today it is 27.13, showing an enhancement in value compared with one year ago of 10.63 cents, or $53.15 per bale, and higher, perhaps much higher prices eventually appear to be inevitable unless there is a resumption of hostilities in Europe, which we think unlikely.

Exports from the United States continue on a free scale, now near the three million mark, to be exact 2,968,000 since August 1st. vs. 3,179,000 to corresponding date last season.

Spinners takings remain large also considering the scarcity of raw cotton and the comparatively high prices prevailing, to date 6,936,000 compared with 7,326,000 to even date last season, and of late have been running abreast of weekly acceptances of one year ago.

The crop is being marketed so rapidly that it is probable that about 9,000,000 bales of the 9,600,000 ginned to January 1st. will have come into sight by the close of this month, leaving very little of last years crop, plus the small carry-over in the interior at close of last season, to be marketed after February 1st.

In other words we figure that the South has yet to market only about 3,293,000 bales vs. 5,538,000 on hand at this time one year ago, and as the world's visible supply of American cotton is only 3,372,000 vs. 4,209,000 last year, the world's available today is only about 6,665,000 bales against 9,747,000 one year ago, or 3,082,000 less than at this time last season.

After this time last season spinners of the world took 5,758,000 bales, and if they should take as much during the remainder of this season, the world's carry-over of American cotton, exclusive of mill stocks, would be only about 907,000 bales vs. 3,989,000 last year. All of which indicates the need of a very large crop for next season and to replenish stocks.

Inasmuch as prospects are for the world's carry-over of American cotton, exclusive of mills stock, at the end of next July to be about 1,000,000 bales against about 4,000,000 last year, which would be scattered throughout the world, stocks at important points would be reduced to a minimum and absolute exhaustion would likely be the case at many of the world's concentrating points.

The total consumption of raw cotton by American mills, including linters, for the first five months this season was 2,949,000 bales vs. 2,770,000 for the corresponding time last season, or an average per month of 590,000 bales, and if the same ratio per month is maintained until the end of the season, American mills will have consumed during the whole season about 7,080,000 bales compared with 6,506,000 last season, of which about 300,000 bales is usually foreign cotton.

The following is from the U. S. Census Bureau report, which shows the destination of cotton exported to the close of December: United Kingdom 890,000 bales vs. 813,000 last season; France 443,000 vs. 383,000; Italy 272,000 vs. 212,000; Germany 494,000 vs. 670,000; other European points, 404,000 vs. 340,000; Japan 293,000 vs. 521,000; all other countries 106,000 vs. 165,000; total from U. S. 2,906,000 against 3,108,000, of which 607,000 were exported during December against 639,000 last year.

We have been consistently bullish throughout the season owing to the small supply of raw cotton and large trade requirements, and are confident of much higher prices being witnessed in the spring and summer.

That we are not alone in anticipating virtual exhaustion of stocks of raw cotton next summer and much higher prices eventually, is noted by the following recently issued by the Department of Agriculture, in Washington: "The entire supply of raw cotton in the United States will be exhausted before next August at the present rate of consumption and exports."

As to new crop preparations and prospects, the outlook is not favorable. The winter has been mild, favorable for heavy weevil hibernation, there is a deficiency of winter rainfall, especially in Texas, to put a good season in the ground, and there is a shortage of farm labor.

The 47th annual edition of "Cotton Facts" the well known reference book, is off the press, and contains many new tables and valuable features. The statisticians of the New York Cotton Exchange have revised and corrected the tables covering weekly receipts, exports, stocks, etc., for several years back, and all other tables throughout the book have been brought to date. The present edition is augmented in value by the addition of several new tables covering world's consumption, production and supplies, probably world's stocks, recapitulation of world's cotton exports for 100 years, etc. In this edition, to the chart which has been a feature of the publication in recent years, showing the fluctuations in prices of spot cotton at New York and Liverpool, has been added the course of the New Orleans market, and the chart as a whole is brought up to December 1, 1922. The book is published by the Shepperson Publishing Co., Inc., 82 Beaver St., New York City.

The name of the American Audit Company has been changed to F. W. Lafrentz & Company. The firm will continue the general practice of public accounting and auditing conducted by them under the former name. It will operate as a partnership with practically the same organization in the branch offices which they maintain over the country. F. W. Lafrentz, who was the president of the American Audit Company and is the senior partner in the firm, is one of the best known accountants in the country, and is also president of the American Surety Co. A. F. Lafrentz, another partner, served during the war with the rank of major, and was also chairman of the finance unit of the war department which passed on credit extensions to government contractors. He is also vice-president of the American Surety Co. C. B. Bidwell, head of the Atlanta office of the firm, will continue in that capacity.

The Maloney Belting Co., of Chicago, has opened a branch at 86 South Pryor St., Atlanta, Ga., with offices and show room. A. E. Anderson, southern representative, states that the branch has been located in Norfolk, but that Atlanta has been selected as a better location.

WANTED: A Job In Your Mill Cleaning Roving Bobbins

Applicant is the Termaco Bobbin Cleaner. Is a rapid and thorough workman. Can clean 36,000 bobbins each working day and clean them without splintering or leaving a particle of waste.

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All who know the Termaco say it is a hard, loyal worker that never watches the clock, asks for a vacation, or goes on strike, because ball bearings are used on all high speed shafting, all gears are cut gears, all parts are interchangeable, and workmanship and materials are of the very highest grade.

Wages asked are very small—less than your mill has ever paid for bobbin cleaning.

Can furnish the highest references from mill executives familiar with its work.

Applicant wants to start to work just as soon as possible.

Complete information regarding the Termaco will be promptly sent you if you write the Engineering Department of the Terrell Machine Co. Will you write today?

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Every machine trade-marked "TERMACO" is sold under a binding guarantee as to workmanship, material and operation.

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Notes About Men You Know.

B. S. PIPER, resident manager of the plant of the Western Reserve Cotton Mills, at Millen, Ga., resigned that position effective January 1, and went to Savannah, Ga,. to undergo an operation.

D. E. TRASK, formerly located in the South, has resigned his position at the spinning plant of Fuld & Hatch Knitting Company, Cohoes, N. Y.

M. C. HOLDERFIELD has succeeded A. N. Hill as superintendent of the Stanley, (N. C.) Hosiery mill.

LAURENCE MACKIRDY has accepted the position of overseer of finishing of cotton piece goods with the American Textile Dye Works, of Milwaukee, Wis.

G. H. LOKEY has been promoted to superintendent of the Winnsboro (S. C.) Mills.

J. F. DEVINNEY recently resigned his position at the Johnston Mills, North Charlotte, N. C., to become overseer of carding at the Robinson Spinning Co., Charlotte, N. C.

R. A. SPAUGH, JR., is now filling the position of superintendent at the Southside Mills of the Arista Mills, Winston-Salem, N. C.

ROBERT HODGEN has succeeded J. P. Heath as superintendent of the Randleman Hosiery Mills, Randleman, N. C.

W. E. BACON, superintendent of the Clyde Mills, Hickory, N. C., is now also superintendent of the City Cotton Mills at that place.

CLAUDE B. SUMMERLIN has succeeded C. B. Johnson as superintendent of the Franklin Hosiery Mills, Winchester, Tenn.

W. N. CARPENTER has succeeded J. B. Moore as superintendent of the Lockmore Cotton Mills, York, S. C.

J. W. MORTON has resigned as general manager of the Star Thread Mills, Athens, Ga., and has been succeeded by James White.

J. E. THOMPSON is now general superintendent of the Grendel Mills, Greenwood, S. C., with W. K. Wood as superintendent of No. 1 Mill and L. E. Foster as superintendent of No. 2 Mill.

R. H. Harrison has succeeded A. L. Quinn as superintendent of the Mary Louise Mills, Mayo, S. C.

G. W. MADDOX has accepted the position of superintendent of the Denison (Texas) Cotton Mills.

W. T. J. BLACKMAN is now filling the position of superintendent at the Elm Grove Cotton Mills, Lincolnton, N. C.

L. C. PARKER has become superintendent of the High Point (N. C.) Hosiery Mills, succeeding C. C. Robbins.

T. H. WANNAMAKER, JR., vice-president of the Glencoe Cotton Mill, Columbia, S. C. died on December 21, following a short illness from pneumonia. He is survived by his widow and one adopted son. Mr. Wannamaker was 36 years of age.

J. M. BROADWELL, of the Grendel Mills, Greenwood, S. C., is now overseer of weaving at the Williamston (S. C.) Mills.

W. C. BRUNER, formerly of Tuxedo, N. C., has become overseer of carding at the Williamston (S. C.) Mills.

J. H. MAYES, manager of the Fitzgerald Cotton Mills and the Cochran Cotton Mills, was recently elected president of the Fitzgerald Kiwanis Club.

G. H. PARKER recently resigned as overseer of spinning and spooling at the Ensign Cotton Mills, Forsyth, Ga. and, accepted a position with The Forsyth Manufacturing Company as overseer of spinning, spooling, twisting, winding and reeling.

H. GARDNER MCKERROW, formerly advertising manager for the National Aniline & Chemical Co., is now associated with the Hazard Advertising Corporation, 7 East 42nd Street, New York City. Mr. McKerrow's long experience in the textile business, together with his acquaintance with advertising generally, will enable the organization to handle textile and dyestuff accounts with a complete understanding of mill processes and methods. There is becoming widespread among the mills of the country a move in modern developments of merchandising manufactured textile commodities, and this step on the part of the Hazard agency in associating with their staff a recognized expert in this line is a preparation for meeting this situation.

WILLIAM M. NIXON, president of the Atlanta Woolen Mills, Atlanta, Ga., died recently following an extended illness. He was 76 years of age, and founded the Atlanta Woolen Mills in 1896. He was an active member in the First Methodist Church of Atlanta. Mr. Nixon is survived by one son, Vaughn Nixon, secretary and treasurer of the mills, and three grandchildren, Miss Emmie, William and Vaughn Nixon, Jr.; two sisters also survive.

JOHN C. TURNER, with headquarters in Atlanta, Ga., P. O. Box 1344, is representing the Charles Bond Co., of Philadelphia, in the Georgia-Alabama-Tennessee territory.

FRED A. MARSH, general purchasing agent of the Link-Belt Company, 910 South Michigan Avenue, Chicago, died on the evening of December 11th, 1922, at the age of 52 years. Mr. Marsh had been a member of the Link-Belt organization for over 33 years.

J. C. ELLER is the overseer of spinning at the Monroe (Ga.) Cotton Mills, with R. E. Hunnicutt second hand on the day run and J. O. Dawson second hand at night. J. H. Perkins is carding overseer, Alvin Bird second hand day and W. L. Stroup second hand at night. S. W. Ingram is overseer of weaving, and J. C. Perkins and Tom Smith are second hands day and night, respectively. Guy Wallace is master mechanic and Frank Wayne yard foreman. J. Wheeler Mears, Sr., is superintendent.

JAMES G. TRUITT, one of the pioneers in the development of the cotton manufacturing industry at LaGrange, Ga., died in January in his 73rd year, following an illness of a few days' duration. He is survived by his widow, three brothers, Alfred Truitt of Atlanta, and C. V. and Shorter H. Truitt, of LaGrange; and four sisters.

ARTHUR O. BUZZELL, manager of The J. H. Williams Co., Millbury, Mass., died on Monday, December 25th.

A booklet of sixteen pages containing a condensed description of all the company's products has been distributed by the Combustion Engineering Corporation, Broad Street, New York City. This is the first general catalog issued by the company covering the entire list of their manufactured products.

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Canadian Representative; W. J. Westaway Co., Main & McNab Streets, Hamilton, Ont. 400 McGill Bldg., Montreal, P. Q.

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Men with years of experience—men who know the needs of the textile industry have produced the U S Bobbin—a bobbin lighter, stronger and absolutely smooth and true. They have perfected a system of testing every bobbin on your own spindles, which eliminates any that do not run true.

Behind every U S B & S Co. product stands its enormous organization — EIGHT plants —i ts large staff of experts, which assure you utmost quality and entire satisfaction.

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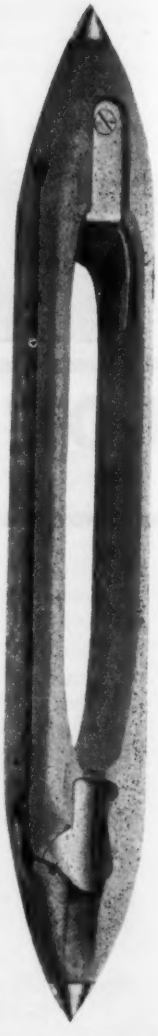

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Eight Factories

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AN OLD TIMER SAYS

Guess you remember the visit "Old Timer" made to see one of his friends who he had heard was one of the best superintendents in that section of the country—the fine reports I had heard about my friend's mill caused me to look forward with a great deal of pleasure to having the opportunity of going through his mill.

Now, by George, I don't know whether it was so much pleasure after all, because when I happened in on him again the other day, he was just about the busiest man I ever saw. He was as busy as a stack of monkeys— in fact he reminded me of the time when I first remember seeing fly paper. The old man at the cross-roads country store had bought some fly paper, and we boys had never seen any before and naturally wanted to see how it worked, so we slipped a package of it out while the old man was waiting on a customer and went out back of the store to give it a trial.

We spread all the sheets in the package out on the ground side by side and waited for the flies to come. One or two flies did come around, but they didn't come fast enough to suit us. There was not enough action, so to speak. About that time the old store cat walked up to see what was going on, and that gave us an idea. We dropped Mr. Cat right in the middle of all that fly paper. Now talk about being busy— well, I don't know just how to tell you about it, but if you ever get to where you can't describe the word "busy," just think of that cat on that fly paper.

As I said, my friend reminded me of that cat, the way he acted. So I didn't ask him a single question about his mill and got away as quick as I could. But I'm going back some of these days, and when I do, look out!

You remember he only let me get through the cloth room before, but as soon as he gets over his sore spell I am sure he will see that he is the man who really did get the most benefit out of our little investigation, and he will write me to come back and go all the way through with him.

You know, people are very easy to forget what has been done for them by their old friends. I have had the pleasure of promoting and causing to be promoted several mill men in my twenty-six years experience, and then to drop in on one of these men several years later, when he had made his mark as a successful man, and realize by his actions and conversation that all I ever did for him has now entirely passed out of his mind. That's hard, yes, awfully hard, on an old man's feelings.

Now let me tell you, young man, don't you ever be guilty of such a trick. A man who is grateful, who shows his appreciation not only at the time he is being favored, but who never forgets that he could not have risen to where he is but for the many aids of his friends—that man will continue to receive kindnesses and help. The other fellow may need a kindness some day—things may not always go just right with him; then and not until them will he realize his mistake.

But I am getting off of the subject—let's see; what is the subject, anyway? Oh, yes, I intended to tell you about a little visit I paid another mill on down the line, after I left that busy friend of mine.

I didn't know the superintendent at this place very well, but I did know his carder pretty well, and of course was anxious to get to shake his old "paw" again. I blew into the office and, bless my life! if this superintendent wasn't real busy too. Not the kind of busy my friend back up the road was; this man was just honest-to-goodness busy; no put on at all. But he was a real nice fellow, you could just tell he was a perfect gentleman and when I remarked that his carder was an old friend of mine, he very kindly gave me permission to go right in and make myself at home.

But, remembering my rather embarrassing experience back up the road, I was just a little slow with that "making myself at home" stuff, so I went to the carder's office to wait for him to show up.

Well, I waited. Then I waited some more. Then I decided I had found one overseer who didn't loaf at his office more than half the time anyway, when here he came, in a hurry and looking as mad as a wet hen.

"Doggone, 'Old Timer,' I'm glad to see you."

"Same back here, Jim, how's the old lady and the kids?" I asked.

"Kids!" he exclaimed, 'Good Lord, man, don't you know the kids are all grown and married off. How long has it been since I saw you, anyway?"

"How's your work running, Jim?" I inquired.

"Oh, pretty well," he replied, "except it's the hardest blamed place I ever saw to keep the numbers straight. I believe something is wrong on my pickers, but I can't just put my finger on it. I was coming in here to get the catalog, so suppose you go down with me and we will look 'em over."

Now that sounded good to me because I was just itching to get in that mill.

Well, the first thing that struck me when we got to the picker room was that he had two kinds of finishers and two kinds of intermediates. In other words, the mill had been enlarged and the second installation was of a different make of pickers.

"Jim, why have you got two kinds of finishers?" I asked. He looked at me like he thought I was a fool and replied that he didn't buy the machinery; it was in there when he came. "Yes, but Jim," I asked, "why don't you just take those two old finishers and move them back to where the two new intermediates are, and make finishers out of the two new intermediates?"

"Sure, 'Old-Timer,' " he agreed, "I'll do that just as soon as I can talk it over with the superintendent." "Isn't it strange," I continued, "that you find mills that have been running for years that way? No wonder they have trouble keeping numbers because it is almost impossible to get two different makes of pickers to produce exactly the same kind of a lap. I once took charge as superintendent in a mill that had four finisher pickers arranged just like yours, Jim, two old ones and two new ones, and when I started in to see what I could find, I asked the carder to have a few laps weighed for me, and they certainly weighed all right, but as I continued to follow up the weights through the mill I saw plainly that something was wrong with the numbers, and I went back to the pickers and found that although the laps weighed exactly the same number of pounds and the single yards we weighed did not vary badly, we did find that the old picker laps were ½ to ¾ of a yard longer in the full length than the ones from the new pickers.

"You see, Jim, this little variation didn't show up much on the ounce scales but it was there just the same and when it happened that card slivers made from *all* old picker or new picker laps struck the drawing *together*, it made that drawing vary from the standard."

"Thanks for the tip, 'Old-Timer,' " said Jim, and we passed on to the card room.

"Your cards look pretty old, Jim," I commented, "but they are nice and clean and the web looks pretty smooth." I picked up the web and it fell apart when I lifted it up from the doffer. "Don't seem to be very strong sliver, Jim," I said, "Suppose you call your grinder over here and let me ask him a few questions." I asked the grinder what he was setting to and the settings he gave me seemed to be very good.

Then I asked him if he had any trouble setting his flats down to the proper gauge on the front stand. "Yes," he replied "if I set the front stand down it will face my clothing." Well, we let the grinder go on about his work and I tried to show Jim why the grinder couldn't set his front stand down to the proper gauge.

"You see, Jim," I explained, "your chains are old and have worn enough to let your flats get farther apart than they were when the chains were new. Then the sprocket which pulls the flats around has not worn to amount to much, so the teeth on the sprockets are the same distance apart that they were before your chains became worn.

"Now the back of each flat is the same as one tooth of a driven gear running into the teeth of the sprocket which is the driving gear. When your chains wore, that let the flats farther apart and as they come around to mesh with the sprocket the two gears do not mesh properly like they did when the chains were new. Therefore, the tooth on the sprocket hits on *top* of the rib of the flat and pushes the flat against the stripping plate and that pushes the stripping plate against the cylinder and faces the clothing. That's the reason your grinder is leaving the front stand backed off and that part of your cards are not doing any carding at all."

"Well I'll be darned," exclaimed Jim. "I never thought of that, but now I see that all my cards are in the same fix. But how are you going to fix them?"

"Well," I suggested, "you can get the superintendent to buy new chains and—" "No, I can't, either," he interrupted, "that's simply out of the question. He's a weaver and I never would get him to see into that in the world and you know new chains will cost like the dickens."

"Then the next best thing I see you can do," I said, "is to take those sprockets off and get the mechanic to cut a band from a piece of high pressure pipe and fit it onto the outside of the disc and pin it with small pins; then turn both discs (each end) up true in the lathe—this will make the disc slightly larger in diameter. You will notice that the teeth on the sprocket are very blunt, almost round-nosed. Well, cut off the side of that tooth which strikes the flat ribs of the flats first, that will give the sprocket teeth a chance to get down between the flat ribs before it starts pulling and will eliminate your trouble, put all your card flats to working and give you a much stronger sliver.

"When the mechanic has the sprockets off of the shaft to put on the band, and cut off one side of the teeth, caution him to be sure to get the sprockets back on the shaft with the teeth in the two sprockets exactly in line with each other, otherwise one sprocket will start pulling one end of the flat before the sprocket on the other end takes hold and this will give you trouble.

"The best thing to do is to get your superintendent to buy new sprockets—the card builders are shaping the teeth differently and making the rim a little larger on the new ones they send out as they have discovered this trouble on old cards. The sprockets will not cost very much, certainly much less than new chains."

I looked at my watch, we had been going over that card almost an hour, so Jim says, "Come on down to the drawing before you go; maybe you can help me out some there." We passed a card that was grinding and I noticed the grinding emery was as slick as glass, so I stopped, "That emery is not doing a thing but polishing the ends of the teeth on your clothing, Jim. Why in thunder don't you put on new emery?"

"I did ask the super for some new emery," Jim said, "but he came in and looked at the old emery and said it was not worn out and that somebody had told him all you had to do was to wash it out with gasoline and it would be good as new."

"Well," I replied, "all I have to say is that if I was in your place, Jim, I would have a roll of new emery if I had to pay for it myself. Then I would set those grinders down a little deep and let them knock that glaze off of the teeth; then you will begin to get some good carding." Isn't it strange how some people will strain to save a nickel and lose a dollar?

We were at the end of the card alley by this time, and there were several cans of card sliver pushed out on the spare floor ready for the drawing. "Jim," I asked, "what in the world makes some of your slivers so much larger than the others?"

"Blamed if I had noticed that," Jim said, "let's look at

the back of the drawing; maybe it looks that way in the cans."

But sure enough, when we looked at the card sliver as it was going into the drawing, some of them looked a third larger than the others. Then we noticed that these large slivers broke back much more than the others, so we went back to the cards and started looking over the coiler heads. We found that many of the bearings on the condenser rollers had worn badly and the coiler cover was not putting the weight on the rollers with the result that the sliver was not condensed properly. In fact, the card hands had put a small lump of cotton where the coiler cover rests on the condenser rollers in order to get weight on the rollers. They had to do this to keep the ends up.

Some of the trumpets were also worn until the hole was not round at all, but was oblong in shape and this was allowing the sliver to be large and fluffy instead of condensed as it should have been.

"Gosh," exclaimed Jim, "it looks like I am going to need some supplies, doesn't it?" "Yes, I believe you are, Jim," I agreed. "There goes a singling; don't you see those spoons are all worn where they rest on the stand?" I asked. "Yes, that's one thing I do know how to fix," Jim said quickly, "and I will get right after them tomorrow."

My attention was then attracted to the way the drawing hands were putting up the ends, and I said, "Jim, those fellows sure are experts, aren't they? Did you get them all from Texas?"

"Get them from Texas! What do you mean?" asked Jim incredulously.

"Well, when they go to put up an end they pull the lever on with one hand and then stand back and pop the sliver at the steel rolls just like I saw men in Texas popping their long whips at the oxen's heads when hauling logs," I explained. "They miss about three times and then hit the right place and the end goes up. Meantime you have made several yards of light sliver."

"Experts! Driving steers! Are you trying to make fun of me?" ejaculated Jim, all riled up.

"No, not a bit, Jim; just keep your shirt on," I said. "But darned if it doesn't remind me of driving steers, sure enough, and if you will just make those boys arrange their cans behind the drawing so they can reach the steel rolls with their hands, without throwing the ends up like popping a whip, and then make them put the end up to its place before they pull the lever on, that boss spinner upstairs will soon be furnishing you in cigars. And incidentally, the yarn numbers will begin to run much more even—and maybe the super will find that out and be in a better humor when you ask him to get all these supplies you are going to need."

"Yes, that's juts about right," agreed Jim. "But don't you start making fun of me again with bulls nor cows nor nothing else."

I glanced back toward the cards and saw the card hand putting down a new set of laps. "Come on, Jim, let's go back down to the cards again; there's something else I want to look at,"

We took a handful of sliver out of several cans where the full laps had just been put on and went up to the office to weigh them. His standard sliver was 50 grains and we found several that weighed 60 to 80 grains and one that weighed 96. We also found a few which weighed under 50 but not as many light ones as heavy.

Poor old Jim! He began to turn red in the face and bit off a chew of tobacco large enough to last him a week. "I'm going right down there and fire that card hand. Any blamed fool could lay down laps better than that."

"Wait a minute, Jim," I said, "that card hand isn't to blame."

"The hell he isn't," exclaimed Jim. "No certainly not," I replied, "have you ever weighed the sliver before when he was laying down laps?"

"No," admitted Jim, "I don't believe I have."

"Have you ever taken the time to show him just how a new lap should be joined onto the old one to prevent this very uneven work? Now suppose you and I go down there and see if we can lay down some laps without making any variation in the sliver."

Well, Jim cussed some more but he sure did cool off toward that card hand after he had tried laying down a few laps himself and had seen the sliver weighed. To tell the truth, we stayed right there all afternoon, all the card hands, the grinder, the second hand, Jim and I, and we sure had a time. Of course we never did get to where we could lay a lap down without any variation, but we convinced every hand in the room that here was something to be careful about and that more uneven work was coming from this one source than all the other things in the mill put together.

"Whenever you have trouble with uneven work, Jim," I advised, "go to your cards and drawing and fix the *operatives* at these two processes before you do anything else. Remember this: operatives generally make more uneven work than machines do."

"Yes, by Heck," he replied, "I'm beginning to find that out."

Stopping time! I started to tell Jim goodbye. "Not on your life, Old-Timer," said Jim. "You are going right up to the house with me and back down here tomorrow morning. Tonight we will talk over old times and tomorrow we will look over my fly frames."

After supper we settled down for a good smoke, and a long talk of our past experiences.

"By the way, Jim," I spoke up suddenly. "Have you got two kinds of drawing like you have two kinds of pickers?"

"Yes we have," he answered. "The new drawing was of course put in at the same time the new pickers were. But why do you ask? There couldn't be any difference in the drawing, could there?"

"Well, I was just thinking about the steel rolls," I said. "You know all drawing hasn't got the same size steel rolls and I understand they are making a different size steel roll now."

Well, the more we talked about it the more anxious Jim became to go measure those steel rolls.

"Come on, 'Old-Timer,' " he said finally, "I'm going right down to the mill and measure those darn rolls tonight."

"Wait 'till morning, Jim," I suggested. "That draw-

(*Continued on page* 321.)

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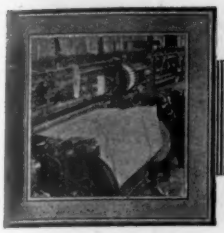

How Other Men Manage

Practical Discussions by Cotton's Readers on all varieties of Mill Subjects

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

Figuring Spooler Production.

EDITOR COTTON:

In the December issue of COTTON on page 139 "K. (O.)" propounds the following very interesting problem: "How many old timers can figure spooler production by figures knowing the empty spool diameter, full spool diameter, spindle speed and counts. Pounds per spindle, nine hours, 100 per cent." I hope that I may not yet be considered an old timer, but I wish respectfully to submit the following solution, the first step being of course to determine the yarn per spool from which the rest can easily be figured.

Secure five ordinary five cent lead pencils and as much scratch paper as can conveniently be put into an ordinary suit case, together with two spools of the yarn in question, an ordinary two foot rule, a micrometer and an S wrench of any convenient size. Take this down to the railway station and buy a ticket to the nearest hospital for the mentally soft twisted. Make yourself comfortable on a bench in the park and proceed in the following manner:

Put your hat on the ground and unwind carefully into the hat, one of the spools of yarn down to the first layer. Do not pay any attention to the green rabbit looking at you from behind the tree, or the pink snake trying to crawl up your pants leg. They are both imaginary. Compute the length of the first layer of yarn by counting the number of rounds and multiply that by *pi* times the diameter of the spool barrel, plus the diameter of the yarn, which you no doubt already know. On account of the spiral arrangement of the yarn this calculation will show some slight error which can easily be corrected by taking a vernier reading on the S wrench, which multiplied by the sine of the angle of ascension, divided by the cosine of the angle of declination and subtracted from the sum of the abscissa and the ordinate will give the cube root of the error. I do not think the theory of relativity is applicable to this case.

Replace the second layer on the spool exactly as it was before it was taken off, taking care to arrange the tension exactly as it was before. Never mind the rabbit or the snake. Grasp the S wrench firmly in the right hand, knock the squirrels off the back of the bench, and proceed with the second layer, same as with the first. After computing seventeen or eighteen layers in this manner it will be found that, provided the yarn has been replaced in the proper manner, a new source of error will have arisen due to the fact that the middle of the spool has grown somewhat larger than the ends due to the method of winding the yarn and therefore the diameter of the spirals is not the same in all cases. This can be easily overcome by measuring each coil separately with the micrometer and checking that for error with the two foot rule. Of course the length of each layer of yarn should be added to the preceding layers as soon as determined until the spool has been wound full again and the total length of the yarn on the spool is obtained, from which, the number of the yarn being previously known, the weight can readily be calculated.

When this has been done, the other full spool can be used as a check by balancing each spool carefully in each hand alternately until the difference in weight, if any, has been accurately determined. If this difference amounts to as much as a microcrith you are wrong somewhere. Either your measurements have not been accurate, or else you did not put the yarn back right. In either case it will be best to hand your hat to one of the guards who will be standing around by this time, and he will pin on it a little badge which will be all your own, and which will have on it a number, the square root of which will be the amount of error.

If any of the readers of COTTON disagree with me on this solution I would be glad to hear from them.

Non Compos. (Ala.)

Some Differential Comparisons.

EDITOR COTTON:

You wrote me some time ago inviting me, as a new subscriber to COTTON, to take part in the practical discussion department of your magazine. I make a practice of studying, not merely reading, the discussions that come out and I think they are very beneficial to practical mill men. I am taking your invitation to take part in these discussions at face value—hence this letter.

"Wash (Mass.)" makes a statement in the November issue with which I cannot agree. In comparing the Houldsworth or sun and planet differential with the new Daly differential, he says that the Houldsworth is better because of the ratio of the gears from the bottom cone to the differential sleeve. He seems to think that the Houldsworth motion is easier on the cone belt because a 20 tooth gear drives the sun wheel which often has 140 teeth. His argument is very misleading and it seems to me that he is overlooking the facts in the case.

I think it would be much better to compare the ratio of the gears from the bottom cone to the bobbins in both types if he wants to compare the two differentials on this basis. Why stop at the outer sleeve of the differential?

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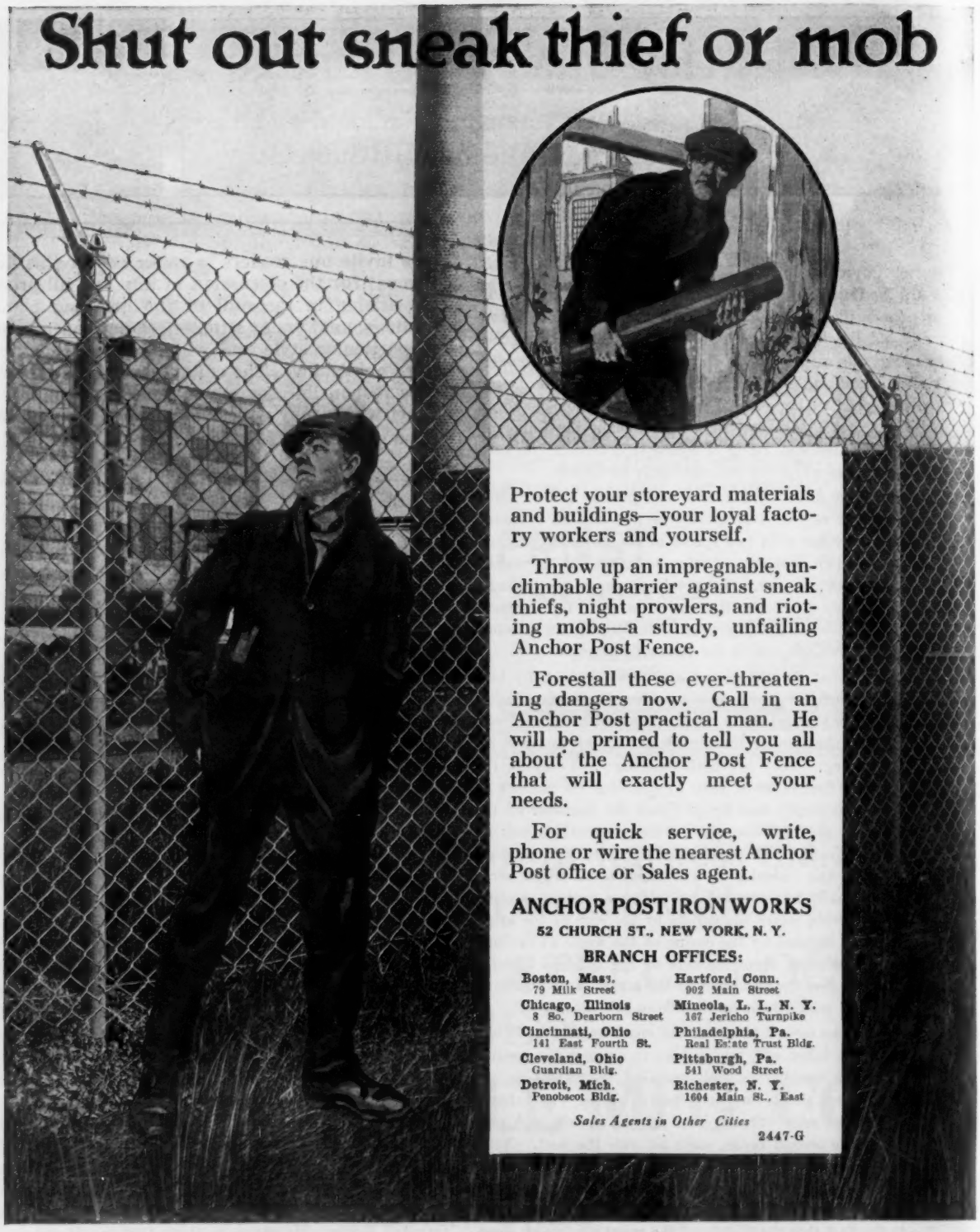

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It has been stated from time to time that with the Houldsworth differential, if the bottom cone was raised, so no power could come through the cones, the bobbins and spindles revolve at the same speed; or in other words *all* of the excess speed of the bobbins comes from the cones. I think this is correct.

It has also been stated that with the new or Daly differential, if the bottom cone is raised, the bobbin and spindle do not revolve at the same speed. This is also correct—but it has not been stated whether the bobbin or the spindle turns faster.

As a matter of fact, without any aid from the cones, the bobbin already revolves faster than the spindle, or in other words, with the Daly differential the cones only furnish part of the excess speed for winding.

I do not know if such a frame was ever built, but it would be possible to build a frame without any differential at all. On such a frame not only the excess speed of the bobbins but all the power for driving them would come from the cones. This would call for a pair of cones shaped differently from the cones used today and would also call for some other arrangement for raising and lowering the carriage. It would be possible to build such a frame as this, but with this arrangement all the work of turning the bobbins, and of overcoming the friction of the bobbin shafts and gearing would fall on the cone belt.

With the Houldsworth differential only the power to drive the excess bobbin speed must come from the cones.

With the Daly differential only a part of the power to drive the excess speed of the bobbins comes from the cones and belt.

It seems to me that the Daly differential would throw less work and strain on the cone belt for with this motion it has less work to do.

Let's take a concrete example. An intermediate equipped with the Daly motion, and with the driving pulley making 460 r. p. m., has a figured bobbin speed, without any aid from the cones, of 1,205.1 r. p. m. The spindle speed figures 1,198.7 r. p. m. This would give the bobbin a natural excess speed over the spindle and flyers of 6.4 r. p. m., without any aid from the cones. Suppose this frame is equipped with a bobbin 3½ inches in diameter, which would be about 11 inches in circumference. 6.4 multiplied by 11 inches would give 70.4 inches. This amount of winding would take place without any aid from the cones. Suppose this frame is on 5.75 hank roving using a 1.2 twist multiplier; front roll 1⅛ inch with a speed of 118 r. p. m.; and it delivers about 415 inches of roving per minute. Of this 415 inches of roving delivered 70 inches will be wound by the natural excess speed of the bobbins, leaving 345 inches to be wound by the cones. This is with the Daly differential.

With the Houldsworth motion all of the power for winding must come from the cones and 415 inches is 20 per cent more than 345 inches. It seems to me that the Houldsworth cone belt would have 20 per cent more of the winding work to do causing more slippage and a shorter life of the belt.

Of course this percentage would not be as high when the bobbin was less than 3½ inches in diameter for the 6.4 r. p. m. natural excess would wind on a shorter length, but on the other hand if the bobbin was larger than 3½ inches in diameter the percentage would be higher.

As I see it the cone belt has to bear its share of the friction of bobbin shafts, gearing, etc., in fact it must do its share of all the work accomplished through the differential whether it be Houldsworth, Daly, Tweedale, Curtis or Rhodes, or what not. Its share of this work as compared with the total power required for it, will be in the same ratio as the total number of revolutions the cones contribute to the bobbins, compared with their total speed. In other words if the cones contribute 50 revolutions out of a total bobbin speed of 1,250 r. p. m. the cones would be called on for 1/25 of all the work accomplished through the differential. The cones that contribute the smallest percentage to the bobbin speed have a smaller percentage of the friction to bear.

In the example given the Houldsworth cone belt would be called on to bear 20 per cent more friction of shaft and gear than with the Daly type.

Now one more point and I'll be through. It has been mentioned that in the Houldsworth differential a 20 tooth gear drives the sun gear which often has 140 teeth. This was sighted to show that the work of the cones was lightened by the high ratio of these gears. There is some truth in this, but how many times does the sleeve turn for one revolution of the sun gear? It turns two revolutions for one revolution of the sun gear, and this makes the sun gear twice as hard to turn as if the sleeve and sun gear made turn for turn. The speed of the sleeve is equal to the speed of the jack shaft, plus twice the speed of the sun gear. This makes the sun gear twice as hard to turn as the gear ratio indicates it would be. This would make the real working ratio of this arrangement 20 to 70 instead of 20 to 140.

The Daly motion was designed to lighten the work done by the cone belt and I think it accomplishes this even if it has some short-comings in other respects.

A. J. D. (South Carolina.)

A Picker Room Question.

EDITOR COTTON:

I would like to have the following question discussed in your columns by COTTON'S readers:

What is the value of testing the individual yards of laps, say taking 10 or 20 one-yard cuts from the finisher laps once per week, when the finisher is set to deliver a lap 53 yards long, equalling 42 pounds, and the lap is 40 inches wide, and expected to average 12½ ounces per yard? The information desired in this connection is, that if the laps are true to yardage and weight in the bulk, what is the value of the test of ten cuts of a yard each?

P. (Ala.)

"Wash" Finds a Discrepancy.

EDITOR COTTON:

I see in the December issue that "A Chinese" is trying to square himself with himself. In his first letter, in the May issue, he spoke of stock ⅞ to 1⅛ inches in length; now, he says, he is running from ½ to ¾-inch stock.

Read the fifth paragraph of his first letter in May. Goodnight! I will leave him to try and square himself with himself.

Wash (R. I.)

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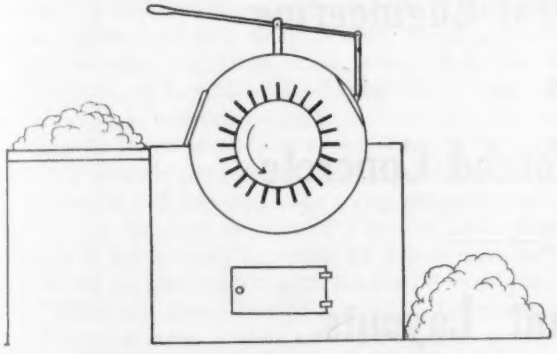
A Waste Cleaner for Card Strips.

EDITOR COTTON:

In the October number of COTTON, "M. R. (Ga.)" wants to know the best method of cleaning card strips preparatory to running them back into the regular mix.

In all my travels, I have seen many methods for doing this, but the best one I found in a New York mill, and the idea belonged to a carpenter. The machine was home-made, and consisted of a frame made of wood, similar to that of the old-time waste machines for running stick waste.

The machine was 40 inches in width. The accompanying sketch gives a general idea of the proposition. An apron was provided at the front of the machine on which the strips were placed before feeding, and there was a door in the front of the machine, and a door in the back. The front door was raised by the left hand and a portion of stripping thrown in; after a minute or two the back door was opened by means of a shifter and connections, the handle of the shifter coming or reaching in front of the machine. The cleaning agent inside what I term the



beater box consisted of a wooden barrel having the same dimensions as that of a section beam. The barrel was covered with pegs about four inches in length, arranged spirally, three inches apart; there were four rows in all. The pegs looked like pieces of old broom sticks.

At the bottom of the beater box or under the beater there was a screen shaped or rounded so as to take up one-half the cleaning area. The screen was set about 1½ inches from the ends of the pegs. The screen was just common sieve wire or screening. Wash (R. I.).

Reversing the Direction of Card Flats.

EDITOR COTTON:

I have no objection to "G. H. T. (Mass.)" taking exception, in the December issue, to a letter contributed by myself to your September issue on my experience in reversing the direction of travel of the flats on my cards.

However, after reading "G. H. T.'s" letter, I should like to ask a couple of questions for him to answer: First, does he run staple cotton, and has he ever tried reversing the flats? If he runs staple cotton, and has made this trial, I should say that his cotton comes from the Mississippi Delta section. Cotton coming from the Mississippi Delta has about 85 to 95 per cent less neps than that grown in the section where I am located. If "G. H. T." had some of our cotton, and would experiment with his flats running first in the one and then in the other direction, and still took exception to my letter, then I would have nothing more to say.

I want to agree with "G. H. T." that when the cylinder carries the cotton to the flats, it is dirty, and the first flats with which the cotton comes in contact are also dirty. I wonder, however, if he has noticed that the larger particles which come out in the card (flat) strippings are always caught by the first flat which the cotton strikes? This being true, as I believe it is, the larger particles are carried from the back of the card—with the flats running in the usual direction—to the front, which necessarily reduces the carding surface of the flats. With the flats running in reversed direction the larger particles are caught by the first flat with which the cotton comes in contact, and are immediately taken from the card, leaving the surface of the flats practically free from any large particles, naturally giving them a better cleaning surface. Having this better cleaning surface allows the cotton to be finished with a clean flat which, in my judgment, is the proper method of cleaning. Do we not, from the opener through each cleaning process, get a better cleaning after the larger particles are removed from the cotton?

I was once asked, "If, when you comb your hair, would you start combing with a dirty comb?" Should I have to use both a dirty comb and a clean comb, I certainly would use the dirty comb first and have the satisfaction of believing I got my hair clean by finishing it with a clean comb. Since a carding machine is a process of combing, why should it not have the same effect as when combing the hair first with a dirty comb and then with a clean comb?

Contributor No. 73.

Card Room Suggestions by a Trouble Man.

EDITOR COTTON:

I wish to say a few words in regard to carding. I have spent several years traveling among the mills, and find many different ideas in regard to different features of this department.

First of all, I would say that from my observation, too many mills are neglecting some very important things. I am at present in a mill where the condition of the cards is a crime, because of neglect on the grinders' part. The top flats are rubbing the stripping plates or the plates are rubbing the cylinders. I find these plates scored up in such a condition that it is almost impossible to help them very much. The wire on the top flats is broken loose in the foundation. I also find the flats ground in such a way as to be left high in the middle. Some good mill men argue that you can't grind a flat to leave it high in the middle, but I say it can be done—by grinding heavy on one end at one grinding and possibly heavy next time on the other end will leave it high in the middle. I would suggest this method of procedure: Put the roller in the stands, start the flats till the dogs pick up the flat and then stop the flats. Take a 5 gauge and adjust the roller at both ends to the gauge and then start the roller, leaving the top flats standing, and it will be found to be clear. By adjusting the roller at both ends a little, a true setting will result.

I find that about 90 per cent of the mills use the emery fillet just about twice as long as they should. Emery has

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a sharp cutting edge when it is new, and after running awhile it becomes worn slick and only polishes the wire and does not cut. Then, as most grinders set the roll by sound, they have to get too heavy to get the proper sound, and they bend the wire by so doing. This is very injurious to the foundation of the wire. Now I don't mean that emery fillet has to get oiled and look like a razor hone to be slick—when that sharp edge gets knocked off it stops cutting, though the fillet may look good. I don't think over five cards should be ground with the same fillet on the traverse roll. It may cost a little more for emery, but it is much cheaper than card clothing.

I'm not saying this because I would like to see more emery fillet sold; but I have been called to so many mills where I have found the cards in this condition that for their own good I should like to see the mill men heed this suggestion. Why, at some mills I could take my finger and push the wire any way I wanted to and it would stay where I put it! And they expect a trouble man to work 30 minutes on a card and have it make silk!

I also think that if the grinders were paid more there would be more men grinding who would be capable of doing the job. It takes lots of experience and lots of patience to learn to grind cards as it should be done. I had a grinder tell me the other day that he set up some cards to make a sample, doffer to the cylinder, close 5; top flats, 5; licker-in, 5; feed plate, 5; and mote knives, 5. And now that mill has its order in for its cards to be re-clothed, and these cards have only been run two years, so he must have been right.

In another mill they were using a very low grade cotton, putting back the strips, they figured to increase the breaking strength in the spinning by setting the bottom mote knife to a 10; the top mote knife to a 12; licker-in, 10; feed plate, 17. I differ with them—I would have set the licker-in to a 7 and the mote knives as close as I could get them to clear, and the feed plate not further than a 10.

Taking up the drawing: This is another very important part of the card room that is often overlooked. If the proper care is taken of a drawing frame, it means more than a machine for the oiler to pass by once a day and oil. And here is where much uneven work is made. If the knock-off motion is not kept adjusted, the ends run through and the machine runs on till the tender sees it and stops it. One yard of singlings on a drawing frame will go quite a long ways when it reaches the spinning.

Another thing—esepcially where they use metallic rolls—cut drawing is caused a lot of times by the rolls not being properly cleaned, causing a gummy substance to get in the roll, and when the cotton comes over this and goes through, the sliver will be cut.

Another thing is the boss on the roller which is on the top and bottom roll to keep the flutes from rubbing together. If this gets worn and allows the flutes to work down into each other like the teeth on a gear, this also is injurious to the sliver.

The back roll on the slubbers also should be kept clean. If lap-ups are allowed to accumulate on this roll it will make very bad work. Many mills, I am sorry to say, could improve their work a lot by cutting down this waste. Of course, we all know it is impossible to run a mill and make no waste, but a lot that is made now is unnecessary. For instance, in doffing the roving frames, slubbers, etc., it is sometimes a practice to thfow all the bobbins into one box. In doing this, very often the bobbin strikes on the little end causing the roving to slip off over the end and become tangled so that the next frame tender won't run off what he could, but will pull off or cut it off. This could be overcome by setting the back row of bobbins out on the front and then taking them and laying them straight in the box. If you will go into a mill where this is being done and then go to a mill where they throw off the roving as they doff it, you will find there is a big difference in the waste figures. The less waste the better all the way through the mill.

What have the other readers to say in this connection?

S. R. K. (N. C.)

Another Cause for Shedding in Weaving.

EDITOR COTTON:

What causes shedding in the weaving? asks "Contributor No. 74," in the November number. Where does the fly come from that collects on all parts of the machines throughout the cotton mill?

"Contributor No. 74," in answering his correspondent, omitted the most vital cause of shedding in the case in point. "We are running 1-inch cotton, making 29.50s to 30s warp from 5.85 to 5.90 hank roving," states his correspondent. The length of the stock is one cause of his shedding, and the law of compensation is another.

Any mill man who can successfully spin 29.50s to 30s yarn from one-inch stock, with a breaking strength of 51 to 53, should be grateful to the cotton grower, and not find fault with shedding. You will find shedding in any mill where 1-inch stock is used; 1-inch stock means that the majority of the fibers are below the one-inch mark. On the other hand, we all have come in contact with those carders who are quick to call you to look under their cards, to show you how much good fiber they are saving for the company. I admire such fellows who have the interest of their company at heart, but what a sad mistake, and who pays?—the spinner, the spooler, the warper, the slasher and the weaver.

Showing all seed under a card is not a credit to a man. The intention is all right, but the principle is wrong. Someone must pay. The fly should be taken out at the card, and it takes a good carder to do it, too. To do it, a certain amount of good fiber must be sacrificed. It is impossible to extract only the undesirable fibers. Remember, for a stock one inch in length, it is not possible to attain a proper setting of the drawing rolls on the drawing, slubbers and all the fly frames. On the drawing frame we find in most cases a 1⅜-inch front roll; on the slubbers, a 1¼-inch front roll; and very often a 1¼-inch front roll is found on the fine and jack frames.

Because of this wide setting many of the short fibers ride from one roll to another instead of being drafted, and of course some escape the strand and fall on the roller beam into space. However, some do not escape and are about to leave the strand when the action of the drawing roll pulls them through crossed and in all shapes. To verify this, it is only necessary to get a large magnifying glass, run the frame slowly and watch the drawing rolls at work or in action upon stocks having a varying length. Therefore, we must admit that the length of the stock in this case is one reason.

Again, let the reader look up his machine catalog, and he will find the front bottom or steel roll to be 1⅜ inches in diameter, and the other three lines of rolls all 1⅛-inch in

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diameter. Now add 1⅜ and 1⅛ and you have 1¼ inches from center to center without spreading. For such high speeded rolls, we must allow at least a spread of ⅛ of an inch. Therefore, when the rolls are set as close as possible, there is a space of 1 5/16 inches. Now let us suppose that this trouble of shedding was in a fine goods mill, and we found the drawing rolls to be set ¼ of an inch over the length of the staple, would it not have to be admitted that this at least would be one cause of the trouble? And have we not such a condition in the case in hand?

That's why I am very much opposed to running waste, simply because it has such a tendency to fly, and the sad part of it is that it does fly, or at least a part of it does.

According to the reasoning of "Tom (Mass.)" a long draft of 158 inches should remedy the trouble in this case.

What's become of "Tom," anyhow?

Wash (R. I.)

Calculating Yarn Numbers and Contraction Percentages to Produce a Given Piece of Cloth.

EDITOR COTTON:

The question of the proper percentage of contraction to use in calculating for numbers of yarns to produce a given piece of cloth is a subject which is almost a nightmare to all textile students, overseers and superintendents who are trying to arrive at something definite in mill calculations.

I have studied every textbook I could get hold of; I have questioned textile school directors; I have bought correspondence school courses; yet I am still groping in the dark, so to speak, trying my best to get definite information on this subject.

Practical experience, coupled with the theoretical knowledge of course, gives a foundation to start on, and the time may come when someone can tell us what percentage to use for contraction and added weight in calculating for yarns to produce certain styles of goods in all mills, but I am afraid it is some distance off yet.

However, we should all make known our findings from a practical standpoint so that we can continue to gain in knowledge along this line. To illustrate: I once made calculations for making a style of goods which I had never made before, and when it was placed in the loom the goods were the correct width on the roll of cloth, but when the cloth was folded it was ½-inch too narrow.

This was a low sley and pick window shade goods, and as I had not made it before I did not know that it had to be made too wide on the loom to give the required width in the folded cloth, therefore my first set of warps were all too narrow, didn't have enough ends in them.

I merely mention this particular case to bring out what I shall try to show in the following calculations, that is, the value of practical experience.

In my early experience with mill calculations I was very much worried over the fact that no one could tell me how to arrive at the exact number of yarns required to produce a given piece of cloth and how to determine the exact contraction a loom would make on a style of goods which we had never actually made, etc.

But after I had several years of experience and had begun to understand the calculations better, I realized that it was possible to arrive at a close enough figure to get a style of goods started, then make corrections as quickly as possible before too much yarn is made up.

However, we make many mistakes which sometimes are rather hard to correct afterwards. In ordering reeds for a style of goods you have never made, for example, and which is not anything like what you are making with reference to weight, pick and sley or yarn numbers. At any rate I hope the following information, even if not theoretically correct, will be of service to someone.

Given: a style of goods with 80 ends and 80 picks, 39 inches wide, weighing 4.00 yards to the pound.

Required: The harness, reed number, number of ends, warp and filling required to produce this cloth.

Solution: Allowing 6 per cent for contraction in width, 100 — 6 = 94 per cent.

39 inches ÷ .94 = 41.5 inches at reed.
80 × .94 = 75.2 threads per inch at reed.
75.2 ÷ 2 = 37.6 dents per inch in reed.
37.6 × 41.5 = 1,560 dents in use.
1,560 × 2 = 3,120 ends.
3,120 + 24 selvages = 3,144 total ends in warp.

It is a good idea to use 100 yards of cloth in order to avoid large decimals, therefore we multiply the total ends by 100 yards:

$$\frac{3144 \times 100}{840 \times 30s} = 12.47 \text{ lbs. of 30s yarn in 100 yds of cloth.}$$

We arbitrarily use 30s warp as that is the size warp most mills use in making print cloths.

Allowing 17 per cent for size and contraction, 100 — 17 = 83 per cent, then 12.47 = 83 per cent of the weight of the warp in 100 yards of cloth. 12.47 ÷ .83 = 15 pounds of warp after adding size and allowing for contraction.

100 yards of 4.00-yard goods = 100 ÷ 4 = 25 pounds of cloth containing both warp and filling. 25 — 15 = 10 pounds of filling in the 100 yards of cloth.

4.15 (width of yarn or warp at reed) × 80 = 3,320 inches of filling in one inch of cloth, which is the same as the yards of filling in one yard of cloth. 3,320 × 100 = 332,000 yards of filling in 100 yards of cloth.

332,000 yards of filling weighs 10 pounds, found by subtracting the weight of the warp from the weight of the warp and the filling. Then the filling number would be found by dividing thus

$$\frac{332{,}000}{840 \times 10} = 40s \text{ filling}$$

(The warp must always size 30s and not 29½s if it is expected to make these goods with 40s filling. If the warp is not kept light enough it may be necessary to make 41s filling and maybe a little lighter in real damp weather.)

Reed: 37.6 dents per inch spread on 44 inches would give 37.6 × 44 = 1,654 total dents on 44-inch. We use 44 inches for the length of reed because the space of a 40-inch loom will take a 44-inch reed and we want to fill up this space in order to give a good guide for the shuttle and prevent the shuttle from rattling.

Harness: 1,654 × 2 = 3,308 harness eyes on a 44-inch space. Using two shades harness, 3,308 ÷ 2 = 1,654 eyes

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per shade. Using four shades harness, 3,308 ÷ 4 = 872 eyes per shade.

I think it advisable to use four harnesses for this style of goods on account of the rather high sley; 3,144 ends would be pretty much crowded in only two harnesses. Of course two harnesses should be fastened together and act as one shade. I would also advise that the yarn used in making the harness be not heavier than 9/33 and 9/36 would be better. Oftentimes, unless the mill specifies the number of yarn the harness manufacturer must use, they will use twine which takes up too much space. The harness manufacturer of course wants his harnesses to last well so he can prove that his harnesses are better than his competitor's. But the superintendent and boss weaver also want their weaving to run well and they must use judgment in selecting a size of twine that will not take up too much space and at the same time not specify a twine so fine that the harnesses will not last a reasonable time. Harness which lasts 18 months to two years on this style of goods I consider a good harness.

Even on low sley goods such as gauze or so-called tobacco cloths like 28 x 24, 24 x 20 and on down to 20 x 12, the mill man should be very careful about the size twine he specifies for his harnesses to be made of. Because, for these goods, he still uses a 30s warp or lighter, and if the harnesses are made of large twine it will make a large knot where the harness eye is looped and this large knot will break the 30s yarn badly.

In passing, let me call attention to the fact that the great majority of superintendents do not like to make low sley shade cloths and tobacco cloths because it takes such fine filling to get the cloth light enough. But if they would make their warp size *not heavier* than 31s they would eliminate this trouble entirely.

This would reduce the warp spinning production, I will admit, but not as much in proportion as it will be necessary to reduce the front roll speed on filling when he passes 40s, and would not reduce the production of weaving as much as is generally supposed. Therefore he would get a greater poundage production from the spinning room as a whole than he would by making these styles of goods with 30s warp running on the heavy side; generally about 29½s.

A word about the reeds for these low sley cloths. By all means if it is necessary to buy reeds when going onto any style of goods under 48 threads per inch in the warp, get single dent reeds. A mill that will do this will always have the preference over other mills with their low sley goods. The single dent reeds on these low sleys will not cause the weaving to run worse as most superintendents think, because one thread has a dent to itself—while with the ordinary two threads per dent the threads must pass each other in this dent and that subjects the yarn to more chafing than the smaller space of the single dent reed will. The single dent reed absolutely does away with the warp threads laying in two's, and makes a beautiful piece of goods so far superior to goods made with the regular two dent reed that there is simply no comparison.

Another very interesting calculation came up the other day, and I will give it to the readers for what it is worth. They may be asked the same question that I was and it will do them no harm to know how to answer it.

A selling agent was visiting the mill and was telling the mill president that he had a prospective customer who was expecting to buy a large quantity of 80 x 80 goods, but he was experimenting with a small quantity he had had a mill make with 72 picks instead of 80 picks. The mill president asked him what the goods weighed with 72 picks instead of 80 (using the same yarns of course) and the salesman replied that he did not know. At the same time they both turned to me and asked what the goods would weigh. They had to know how many yards to the pound the goods would weigh so they could figure on a price to make the customer.

Well, I made the calculation two ways in order to have a check on my findings. This, by the way, is always advisable and I have found has saved me many mistakes. Always figure two ways if you can.

Here is one of the ways I found what the yards per pound would be with 72 picks instead of 80:

If a style of goods is being produced with the following construction, 80 ends, 80 picks, 39 inches wide, weighs 4.00 yards to the pound, 30s warp and 42s filling, and it is desired to make the goods with 80 ends and 72 picks, to find the yards per pound for this new style of goods proceed as follows:

39 inches wide equals 94 per cent of the reed width, if we allow 6 per cent for contraction. 39 ÷ .94 = 41.5 inches wide at reed. Since we are taking 8 picks from the cloth we will have 41.5 × 8 = 332 yards of filling taken from one yard of cloth.

$$\frac{332 \times 8\ 1/3 \text{ (grains in one yard 1s yarn)}}{42} = 65.8 \text{ grains in 332}$$

yards of 42s filling. 7,000 grains = 1 pound, then 7,000 ÷ 4 (yards to the pound) = 1,750 grains per yard of cloth. 1,750 — 65.8 = 1,684.2 grains in one yard of the new style. 7,000 ÷ 1,684.2 = 4.15 yards per pound.

In other words, we simply find how many grains the picks we are going to leave out will weigh, subtract this from the weight of the regular cloth; this will give the weight of one yard of the new cloth. Then divide the weight in grains of one yard into 7,000 grains in a pound and the result will be the yards per pound of the new cloth with the 8 picks left out.

Here is the other way I figured to get the yards per pound when changing from 80 x 80 to 80 x 72 using the same yarns and width of cloth. Incidentally let me mention that the cloth will be just a trifle wider when changing from 80 to 72 picks—probably enough wider to allow the leaving out of a few ends.

To get the average number of yarn proceed as follows:

Construction: 4.00 yards to pound. 39 inches width of cloth, pick and sley 80 + 80 = 160. A divisor of 713 is arrived at by taking 15.11 per cent from 840 for contraction.

$$\frac{4.00 \times 39 \times 160}{713} = 35\text{s average yarn.}$$

I then use this same calculation except I change the 80 picks to 72, which would give 152 instead of 160, and use 35s as the average number of the yarn with 713, leaving out, of course, the 4.00 yards, because that is the figure we are wanting to know.

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It is easy enough to be comfortable in ordering inferior materials the first and second times perhaps. But a veteran buyer of chemicals is apt to prefer the comfort of standing specifications for R & H stuff.

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$$\frac{X \times 39 \times 152}{713 \times 35} = \frac{5928}{24955}.$$

Of course this should be an improper fraction, but I have used this method to make the calculation easy to follow. Inverting, divide 24,955 by 5,928 and we get 4.20 yards to the pound, which is five points lighter than the other calculation.

I told my boss that the 80 x 72 39-inch goods would weigh about 4.10 to 4.15 yards per pound using our same yarns. In calculating, it is always safer to leave a few points to spare on the *heavy* side as it is much easier to heavy up filling than to make it lighter.

Some one may naturally ask the question as to where I arrive at the 15.11 per cent contraction in one calculation and use 6 per cent in the other. This same question would also apply to the first method I used in arriving at the number of the filling to make in producing the 80 x 80s when using 30s warp. In that case I used 17 per cent for contraction and size on the warp because I was only trying to arrive at the pounds of warp in a piece of cloth and I knew it would take 17 per cent. While in the other method of arriving at the average number of yarn I used 15.11 per cent because there is no size in the filling, and I knew 15.11 per cent was the correct percentage to use.

But how did I know it? will be the first question of any textile student who is reading this article. The only answer I know is that these things must be found out by practical experience. No two mills can produce the same weight cloth with exactly the same number of yarns, calculated by using the same percentages of contraction. Of course the numbers can be gotten near enough to start the filling and warp coming through the spinning by using the theoretical percentages of contraction, but just as soon as you can get a piece of cloth off the loom it should be weighed on the ounce scales to get the correct yards per pound. Then the filling can be made heavier or lighter as needed before much cloth is made.

I have said all of this in order to prepare the reader for the following advice which every superintendent and overseer should follow during all his experience in making different styles of good under the various conditions that prevail at the different mills. Here it is: Determine the *actual* percentage of contraction and size it is taking to produce every style of goods in *your* mill.

By keeping a strict record of every style of goods he can obtain this information on, he will soon build up practical information which will be invaluable to him. Some mill man will get up a record book some of these days in which superintendents and overseers can easily record all such information systematically instead of having a dozen little memorandum books scattered around his desk in which he can't find anything when he needs it quickly. Here is the method I use to determine the *actual* percentage of the styles of goods being made in a mill:

First calculate for the average number of yarn it would take to produce that style of goods *without* any contraction or size (if that were possible, which of course it is not) thus: 4.00 yards to the pound; 39 inches wide; pick and sley, 80 + 80 = 160.

$$\frac{4 \times 39 \times 160}{840} = 29.71 \text{ average number of yarn without any contraction or size.}$$

Now multiply by 2 to get warp and filling: $29.71 \times 2 = 59.42$.

Now if a man actually using 30s warp and 40s filling to produce this style of goods, and knows absolutely the difference between the yarns he is actually making with the size, water and actual contraction being added in *his* mill, and the theoretical yarns without contraction or size, he will certainly have the correct percentage to use in calculating the yarns for this style of goods in his *mill*.

30s + 40s = 70s yarn actually being spun.

$29.71 \times 2 = 59.42$ theoretical average number of yarn.

$70 - 59.42 = 10.58$ difference.

Thus his yarn numbers are 10.58 numbers lighter than the theoretical yarns with no size and contraction. Now $10.58 \times 100 \div 70 = 15.11$ per cent contraction to use in the calculations. $100 - 15.11 = 84.89$ per cent. 840 yards per hank $\times$ 84.89 per cent = 713 which is the *constant* to be entered in the record for this style of goods. Then to use the constant 713 for the 80 x 80 goods, only this simple calculation is needed to find the actual number of filling in that particular mill to produce four yards per pound, thus:

Construction: 4.00 yards to the pound; 39 inches wide; pick and sley, 80 + 80 = 160.

$$\frac{4 \times 39 \times 160}{713} = 35 \text{ average number of yarn.}$$

$35s \times 2 = 70$ warp and filling. $70 - 30s$ warp = 40s filling.

Some of my old records show the following constants arrived at in this way to produce yarns for the following styles of goods:

80 x 80, 39-inch, 4.00-yard goods—Constant 705. (This was in a different mill from the one used in the illustration.)

72 x 80, 41-inch, 4.10-yard goods—Constant 710.

72 x 76, 39-inch, 4.25-yard goods—Constant 720.

68 x 72, 39-inch, 4.75-yard goods—Constant 719.

64 x 64, 40-inch, 5.10-yard goods—Constant 725. (Note that this style is 40 inches wide, not the regular 64 x 64 which is 38½ inches wide.)

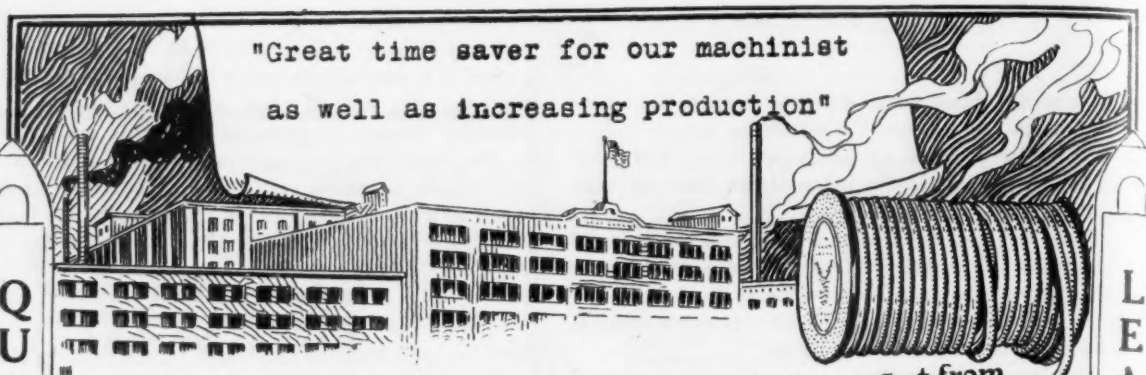
64 x 60, 38½-inch, 5.35-yard goods—Constant 719.

This gives some idea of the varying conditions under which styles of goods are affected in the same mill and emphasizes how important it is for every overseer and superintendent to know what his mill is actually doing. Such a store of information is of course very valuable to any man not only in putting on a style of goods he has never made in that mill but in case he should change to another mill. Contributor No. 74.

Desires Information on the Duplex Carding Device and Its Operation.

EDITOR COTTON:

I would like to see some discussion in the "How Other Men Manage" Department on the duplex carding device. Why don't more mills use the duplex system? Can't we get a better grade of product with the duplex? What is the best setting on the duplex to get the greatest percentage? I am running both the single and the double roll duplex, and anything in regard to the duplex device or its operation will be appreciated. Nero (N. C.)



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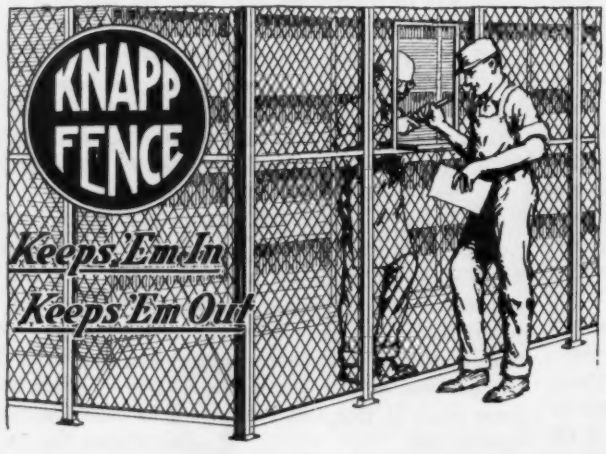

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Setting and Timing Combers.

EDITOR COTTON:

This is my first letter to the Practical Discussion Department, but I hope that it contains what "Bab (N. C.)" wants to know in regard to combers. I can't give him information from A to Z, as he requests in his letter on page 141 of the December number, but I believe I can discuss the comber from the time it arrives at the mill from the makers.

When a comber first comes in, one should take it out of the shooks, and level it, then it should be all taken down but the frame work, the cams and cam shaft; the parts should all be cleaned in kerosene.

Now in timing and setting a comber it is but seldom that we find two comber men with the same ideas, so if mine do not coincide with another man's, the only argument is which setting can produce the best results. Here is my method: The first thing I would do is to set the actuating cams. This is done by setting the caps hard, throw the 80-tooth gear out of mesh, turn the cam shaft until the roller on the pawl is in the heel of the large cam on the head of the comber, then turn the index gear to 5 and slide the 80-tooth gear in mesh and bolt it there, then the fluted and needle segments with the tins should be put in place.

Next I'd put the brass bushings in place, being careful to put them in the places for which they are all numbered Then set in the detaching roll, and have it so as to move freely after all caps are screwed down tight. Then I'd set the fluted segment from the detaching roll with a 1¼ gauge, clock at 5. Then adjust the detaching roll, placing the clock at 8.9, the high part of the segment, with a 22 gauge. From now on all settings will be taken from the detaching roll. In the first place the cylinder is the base of all settings, but as the detaching roll has to be set and free in its bearings, and given a true and accurate setting with the cylinder, it becomes the base of all settings.

The feed roll is next put in and set and gauged according to the staple to be run, then it is removed. The next step would be to set the piece-up motion; this should be timed at 5¾ or 6. The outside cam first, then the inside one, then the brushes are set so they will run well down on the first three rows of needles on the half lap.

Before putting on the nippers, care should be taken that they will hold paper on both ends and the middle, and that the screws are tight. The nippers are numbered and should be placed according to these numbers. After they are on turn the clock to 8.9 (high part of fluted segment) and set them to a 36 degree angle. Set to the detaching roll now with 1 7/16 gauge, and to the segment with a 21 gauge; be sure and tighten the nuts on the nippers. Put paper between the nipper plates and nippers, and then put on the nipper rods. Set the clock at 14.25 and work the nuts on the nipper rods tight with the fingers; set nipper cams at 10½. Be sure the two are working together and then turn to 11.5 and the nippers should hold paper; if not the nuts on the nipper rods will have to be adjusted.

When setting nippers always start by the middle one and take the work screw nearest to the center; that is, if working to the right, take the left screw on each head. After the nippers are all set, as just explained, place a piece of paper on the other screw and work this screw until it holds the paper. Then put back the feed roll, set the top comb, draw box, lap aprons, creel and lap rolls, and coiler.

I should have stated before about setting the leather detaching rolls. Turn until the clock is at the high part of segment 8.9, and set with about 22 gauge. These may have to be moved lower, but by setting a little high you are sure not to damage them. These have to be set so as to take the sliver, and just clear the needles of the half lap.

The brass rolls or top rolls are set with the clock at 8, with an 18 gauge; the top comb shaft 6½ inches from the detaching roll and from the segment, clock at 8, with a 22 gauge. Top comb (old ones) clock at 8, with an 18-gauge, 18 angle; (new ones) clock at 8 with an 18 gauge, 29 angle. Setting this way will give a 21 gauge from the half laps with the clock at 14.25.

Don't let anyone fool you about the stop motion; they will work if they are fixed right, and will give one a lot of trouble, too.

The setting of the rolls in the draw box is according to the length of staple.

The feed should be between six and seven, for I believe you get the best piecing up at the time; of course much depends on the amount of waste one wishes to take out, also.

If you take out the main shaft, be sure to replace it at the same time setting or all of your timing will be out of order.

I don't believe in the tell-tale signals for the ones running the combers depend too much on them. There are lots of points on taking care of a comber, but "Bab," I believe, only wants timing and settings.

Newcomer (N. H.)

A Sanitary Safeguard.

EDITOR COTTON:

Recently the writer was in a mill and noted that there had been painted a white strip around the base of every post and wall. This strip was about six inches wide on the floor and six inches high on the walls and posts. It required only a few moments of reflection to guess what this was for. There was absolutely no trace of spitting on the walls and in the corners.

It is a peculiar trait of human nature to spit in a secluded spot or away from the usual path of our feet. This generally means that the base of walls and posts are the recipients of our sputum. Also, it is a fact that we usually select places to expectorate which are the most difficult to clean or be disinfected by artificial or natural procedure. The death rate from tuberculosis has been decreased in this country largely by prevention of the spread of the disease, rather than by its cure. Recently an appalling toll of human lives has been taken by influenza. These maladies are of serious nature to cotton mill employees. The atmosphere of the mills is necessarily dusty. This requires extra precaution in guarding against pulmonary diseases. Spitting in corners is the most widespread obstacle of sanitary measures in cotton mills, and anything which will help to induce the operatives to spit in receptacles provided for the purpose, or even on the open floor, deserves publicity. It is a sorry specimen of humanity who will deliberately spit on a clean white floor or wall. Most people won't. Of course the main mill floors cannot

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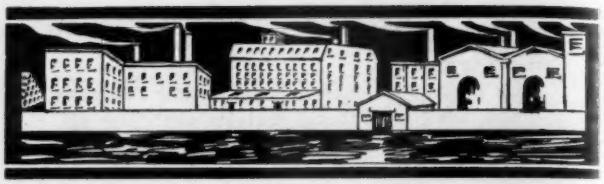

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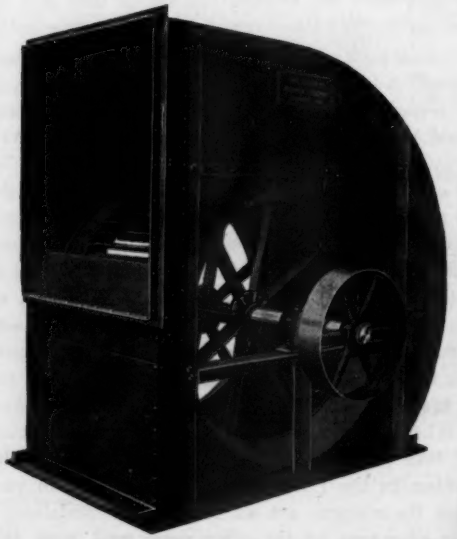

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R. B. S. (Ga.)

Uniform Weights and a Cause.

EDITOR COTTON:

In reading the recent discussion between "Wash" and "W. T. (Mass.)" in recent issues regarding uniform weights on warp beams, I am reminded of what I got into some time ago on cloth weights—and "W. T." may have been in the same boat and did not find it out.

I was running two styles of cloth that were carrying the same numbers of both warp and filling, but were of different weights per yard, the difference being that one style was somewhat wider than the other, and this made the weights differ. We have other styles, but in this case in particular I was fixing to change the two off to another style, so I made some sample filling, as the filling was all that I had to change to make the new cloth, and proceeded to make my sample to start from.

After I had run four looms long enough to get 60 yards from each loom I cut the cloth off and had it run through the cloth room in the regular manner—that is, through the stitchers, brushers, inspectors and folders—and weighed it up and it did not vary but five points from the cloth weights that I was already making. But I wanted it to weigh twenty points from what I was making. I made an inspection to see if the correct filling was used as instructed, and it was, so we made another sample of filling a little lighter still, and ran that through, and it came out all right.

Then I set about to find out what was the matter. I figured all that I knew to figure on the filling weights, and each time I came back to where I started from; that is, figuring from the average number of yarn that made what I was making before and it came out all right; so, why didn't this? I had other styles of cloth in the cloth room besides the two styles that I was figuring on, and one reason that I did not weigh them was that we were not making so very much of it and a bale would only come now and then, and I thought they would be of the regular weight, but finally I decided to weigh some that had already been baled and stacked in the cloth room in the forenoon, and two bales in the afternoon, and there I found the trouble. I did this after closing hours, and found that the cloth checker had doctored the weights to make them come out very near the required standard. And this was an old cloth room checker in whom I had the utmost confidence, too. But you see he fell, as will a lot of them if the superintendent doesn't keep his eyes open.

I never did ask him why he did it, but I suppose he did it to make the weights show up good and even, confident that they would soon come back right. I had a man once on beam weights who did the same thing. And in both cases all that I could ever think of that they might have done it for was to please me, as I make it a practice nearly every day to see some beams and cloth weighed to see with my own eyes how it is going, but the cloth checker got me on the two styles I speak of.

And every time I hear of a man running weights too close I think of those two men and remember that I myself found one time that there may be something dead up the branch. Of course weights can be run very close with good mixing and good, closely regulated humidity, and with other conditions favorable. Sometimes I run closer than I ever thought I could, but I can only hold it for a while as the weights will break off and run a few pounds off standard, sometimes farther than makes me feel good.

With all classes of cotton, a mill man who has been in the mill business long enough to hold the responsible positions that I suppose "Wash" and "W. T." hold, should know about how much certain numbers of yarn should vary, and when the variation gets beyond that point, that something is wrong with something that is not the weather, or the humidity, and he should not have very much trouble in locating it—that is, unless he has a false checker, and then he will have to stay on the job and do some personal work.

T. A. D. (Ga.)

An Old-Timer Says.

(*Continued from page* 303).

ing can't run off. It'll be there in the morning."

"Yes, I know," he said, "but I couldn't sleep a wink tonight unless I found out if the new and old rolls are the same size."

So we got a lantern and went to Jim's tool box to get a pair of outside calipers to measure the exact diameters of the rolls with. Just as I suspected! There was ⅛ inch difference in the diameter of the old and new bottom rolls. Then we looked at the draft gears and did find they had different draft gears on to make up for the difference in the steel rolls.

"Well, anyway, in the morning we will weigh 15 or 20 sizings off of a new frame and the same off of an old frame and add all the weighings together to see if the total weight will show any difference," I said. "You know, Jim, when you look at the average weight there has to be considerable difference to make it show up, but when you look at the total weight of say 20 weighings it will show you the slightest difference and by weighing 20 off of each several times will finally show you whether one of them runs heavier or lighter *every* time.

"If it does then you should change one of the other gears—not the draft gears— until you get the new and old frames running the same."

Next morning we did find the new drawing running the heavier, but not enough to change a tooth of draft so we had a gear made to give us the small difference, and Jim was the happiest fellow you ever saw. He wanted me to promise I would stay all the week with him.

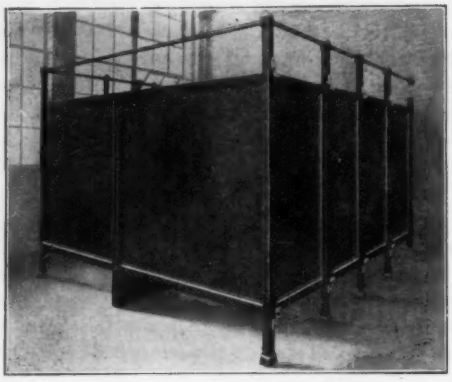
"Think I'm making fun of you now, Jim?" I asked.

"Oh no, but I had rather you would leave off that bunk about cows or something.

"Come on, let's look at the fly frames."

"Don't be in such a hurry, Jim," I said. "Suppose we look at one or two more things on the cards. Call one of your card hands and tell him to take off the roll that the flat strips wind up on. Take the rolls off of all that alley of cards.

"Now while those cards are running and letting the strips fall down on the doffer casing, suppose you have a man pull the licker-in waste out on the floor behind about



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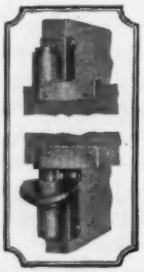

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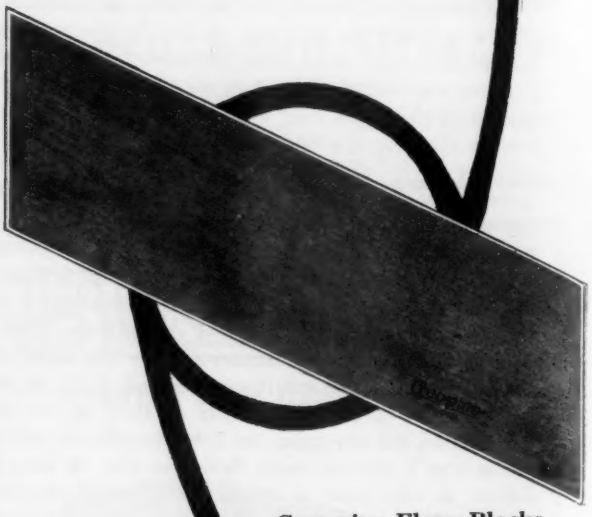

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ATLANTA, GEORGIA—Station I

two lines of cards. That is a better way to see just what the cards are doing than to go along and look under a few cards."

Soon as the waste was pulled out from under the cards we walked down the alley and could see plainly just which cards needed attention. Jim thought it was a real good system and said he would have the waste left on the floor that way about once a week when the card hand was taking out waste so he could simply walk down the alley and see how the cards were doing.

"Yes, and you can have the picker men pull the motes out from under the pickers and leave them on the floor for you to look at once in a while; that will keep you checked up on the condition of your pickers all the time," I added.

"And say, Jim, do you weigh your intermediate picker laps?"

"No, I never heard of anybody doing that."

"Well," I continued, "if you can get the super to buy you an extra pair of scales you have the intermediate laps weighed by the same man that is there. It will not cost you one penny extra and you will certainly have less finisher laps to set back."

"Good, 'Old-Timer,' " said Jim, "I will sure do that. Don't see why I had never thought of it myself."

Then we went back to look at the cards that were letting the flat strips fall down on the doffer casing. "By Heck!" exclaimed Jim, "I never would have believed that there was that much difference in the amount of strips the cards were taking out. Look at that card! Each strip falls down as soon as the comb knocks it off of the flat. And that third card down there is taking out almost a solid sheet."

"Of course you know, Jim," I explained, "that theoretically the cotton from each flat should just hang to the cotton from the next flat by a very thin sheet of fibers holding the two strips together. But believe me, old man, that is some hard thing to do— to get your cards all doing that way."

"Yes, I know," agreed Jim, "but I see right now that I can greatly improve on what they are doing and I am going to take the rolls off of all my cards and show the grinders the cards which need attention.

"Now before you say too much about my fly frames, I want to show you what we are doing to them," he said, as we passed on.

Jim had two men overhauling and he showed me all the things they were doing to put the frames in good shape. And they were doing a good job and I could see that the frames which they had worked over were running very nicely. I stopped off one of the frames and then by jerking the belt shifter quickly to throw the belt on and off the tight pulley just enough to move the gears, I showed Jim that the surface or outside of the bobbin could be moved about a half an inch without moving the flyer. This of course showed plainly that his overhaulers had left too much backlash or lost motion in his gears or that they were badly worn or something.

But Jim looked like he was going to get red in the face again because he had bragged so in telling me what fine work he was doing overhauling those frames so I quickly changed the subject.

"Are these your oldest frames, Jim?" I asked. He said they were. "Don't you suppose the flutes on the steel rolls are worn pretty slick after running so many years and the other side of those flutes have never been worn any," I asked.

"I guess that's right, 'Old-Timer.' "

"Well," I continued, "if you could take the steel rolls out of this right-hand frame and put them in that left-hand frame it would turn the steel roll around, so to speak, and cause the drafting to be done by the side of the flute which has never worn any. That would be the same as putting in a new steel roll, wouldn't it?"

"Yes," admitter Jim, "that sounds all right. But will it work?"

"Suppose you try two frames and then you can let me know next time I see you," I suggested.

The whistle! By golly, dinner time before we got started good!

"Doesn't time fly when you have your mind occupied all the time?" exclaimed Jim.

"Yes, Jim, that's why so many overseers and superintendents get to hating their jobs; they simply try to see how much work they can get out of, and time drags with them until they are soon finding fault with everything about their work and they think they have the hardest job in the country. That causes them always to be looking for a job with the result that first thing they know they are 'bum' overseers or superintendents and are gradually getting a smaller job at every change. Got no reputation at all.

"While on the other hand, if they would take an interest in their work; keep looking for something to do all the time; they would soon fall in love with their work and when a man falls in love with his work he is going to make a reputation for himself.

"I'll tell you some of these days how I think an overseer or superintendent should systematize *himself* with his work in order to enjoy it—but I must be traveling along down the road now."

"What! Ain't you going to stay for dinner with me?" my friend asked.

"No Jim, I've already said too much for one visit—I've got to go."

"Well, 'Old-Timer,' I believe by keeping right in behind the things you have shown me, I can make the best roving of any carder in the South."

"Good for you, Jim! Go to it! You know one man can tell you all these things, but *ten* men can't make you do them. It's up to *you*, Jim, to fall in love with your work. Goodbye!"

"Goodbye, 'Old-Timer.' Be sure to come again."

"I will, Jim,—goodbye!"

"But say! Leave them darn cows at home."

We all go up and down together. Had you ever thought about it? Better cooperate.

This electric light I am working under sure does give a good light, but it has to have "something behind it," so to speak—otherwise it is just a piece of glass and wire. Do you put something behind your work?

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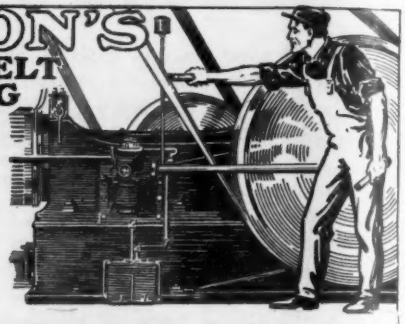

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"Wash" Discusses Fly Frames and Differentials.

EDITOR COTTON:

In the December number, another compliment has come my way. "K. S. (N. C.)" claims that an idea of mine without proof of conclusion is interesting. If "K. S." will watch the future numbers of COTTON, he will soon see the drawings of a truly cone-driven frame which will prove the conclusion of my idea.

"K. S." says I remind him of an old engineer who received his training in Massachusetts. So did "Wash" receive his training in Massachusetts; therefore, history is repeating itself, that is, "K. S." is in the same boat as when he was assistant to the old engineer, things were mysterious then as now because he refuses to be educated.

However, "K. S." deserves a great deal of credit for smoothing over questions he is unable to answer. Being unable to answer my logic, he devotes about half of his article to Newton's Law. "Wash" is also a student of Newton's Law and knows that the only true law of gravitation exists among the planets only, where the masses in the universe attract each other with a force which varies according to the inverse square of the distance and without interference.

But there is a great amount of interference with the function of the presser rod and finger from the beginning to the end of a set of roving. Unlike "K. S.," I am going to answer each of his questions to the best of my ability.

I am sure that "K. S." is not a constant reader of COTTON, or he would not write such trite stuff as he does in the second paragraph of his letter on "Mechanical Laws and Machine Design" on page 119 of the December issue, where he says that "Wash" comes in "with that mysterious skeleton which he calls the relationship of speeds, tension, presser pad and cones."

"K. S." is apparently, to my mind, not a practical man, and of course what I say is mysterious to him. I have in hand a letter from a contributor to this department who says, "You write some dandy articles, and I like the way you clarify your statements." The letter came from "down in Dixie," too. If "K. S." will look up every issue of COTTON from May 1913 to December 1922 he will find that all my articles are not twaddle.

In the fifth paragraph of the letter referred to, "K. S." put his first question. He wishes to know why, when everything is going all right, all the tension is between the bobbin and the presser pad? He answers this himself in the very next paragraph, but evidently when he wrote the sixth paragraph he had his mind so centered on Newton's Law that he forgot the amount of pressure existing on a flyer paddle of a high speeded frame, and he forgot also that the roving must be drawn past the point of pressure.

To make sure that this is understood, let us assume that the spindle on any fly frame is making only five revolutions per minute. In such a case there would not be any pressure at the point of the presser finger. Therefore, we have a tension (if any) from the surface of the bobbin to the drawing rolls. Simply because the strand is free from the drawing rolls to the surface of the bobbin, which proves that there is a great amount of friction offered at this point caused by the pressure of the paddle.

On the other hand, when a fly frame spindle is run at a high speed, say from 1200 to 1300 revolutions per minute, there is a great amount of pressure which makes a firmer bobbin as admitted by "K. S." in his sixth paragraph. "K. S." or any other reader of this department must admit that the amount of roving delivered by the drawing rolls (not considering the amount of stretch) must be drawn under the presser pad, for the bobbin leads the flyer. See the point?

The roving or strand is offered enough resistance to cause slack from the eye of the presser pad to the drawing rolls. This it is that makes the bobbin firm, and that is why different speeds call for different cones. This is one evil that makes conditions unequal on the fly frame.

Then who ever heard of carders changing the number of wraps on the presser finger? They do it in waste mills.

Now read the eighth paragraph and then go back to the sixth paragraph, and you will find "K. S." in an argument with himself. He says I am dead right in stating that a higher speed will make a firmer bobbin, and in the eighth paragraph he would have us change the bottom cone gear to cure or remedy the functions of the presser controlled by Newton's Law as so ably defined by himself.

The same thing will happen on any fly frame of any size whether the carriage is going up or down, if it is a bobbin-lead frame. I simply mentioned the slubber because the strand is coarser and the least defect in the tension could be more easily seen here. When the frame is run on slow speed the strand has more freedom, as stated, and when run at a high speed the pressure of the paddle checks this freedom and in one case we have a soft bobbin, and in the other case a hard bobbin.

In his third paragraph, "K. S." says, "It was not the purpose of my letter in the July number to convince 'Wash' that his ideas are wrong, but that I might induce him to give us practical facts and figures showing that there are real forces and mechanical principles existing to produce the relationship such as he says exists."

Well, what is the matter with the foregoing facts when the cones are considered a continuous string of pulleys?

I will answer paragraphs nine and ten together. In all waste mills, the number of wraps on the presser finger are changed according to the quality of the waste. All that "K. S." states in his tenth paragraph about Newton's Law is okeh if no stock existed between the paddle and the bobbin during winding. But the sad part of it is that when the frame is run at a speed slower than that for which the cones were modified, the diameter of the bobbin increases faster than the lateral action of the cone belt. The increasing diameter due to slow speed interferes with the functions of the presser finger because the increasing diameter is stronger than the pressure of the paddle.

When the stock is wiry or hand-twisted, the strand then becomes stronger than the resistance offered by the increasing diameter of the bobbin, and conditions are held more equal. That is why I have often admitted that a bobbin-lead fly frame will make a fairly even roving, but never like a flyer-lead, for the reasons already explained.

In the eleventh paragraph, "K. S." fell into a trap I set for him. In answer to one of my questions, he states that "the weight of the bobbin has absolutely nothing to do with the winding in this case, any more than it would if we were running a frame on 5 hank roving with say a roving twist 1.30 times the square root of the number, and changed to 5s yarn with 4.75 twist, S. R." Continuing,

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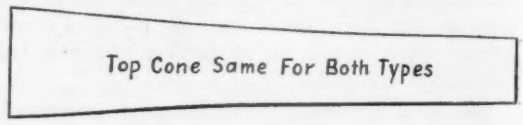
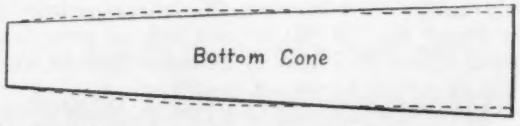
he says, "If this frame was operating in the first case under Newton's Laws, it will operate under the same law in the second case."

No doubt most readers have heard of the Dunn flyer. The average thickness of layers between the Dunn and the Bodden flyers on a fly frame 7 x 3½, was found to be on the Bodden about .0155 average thickness, 70 layers, 1927 yards on the bobbin. On the Dunn flyer, .0147 average thickness, 95 layers, 2524 yards on the bobbins. This should show "K. S." conclusively that the true outline of a pair of cones depends largely upon the type and size of flyer being used. "K. S." should now understand what my meaning is when I refer to the relationship between cones and flyers.

The relationship between cones and flyers is very close indeed, so close that if the flyer is changed the cones must be changed also; one dominates the other. To prove this statement, I have given in a sketch herewith of the cone outlines for Dunn and Bodden flyers that knocks "K. S.'s" theory of Newton's Laws sky high where it belongs. The outline for the Bodden is shown by the dotted line, while the full line shows the outline for the Dunn.

What "K. S." states in the twelfth paragraph of his letter does not agree with my experience. The use of the concave and convex cones do not wind a bobbin satisfactorily, or will not wind correctly on any size of fly frame, as claimed by "K. S.," at least I have never seen it done. Refer to my letter entitled " 'Wash' Finds Some Heavy Drawing Sliver," in the December issue. Here I give some good reasons to prove that winding on the bobbin is not perfect.





In the thirteenth paragraph "K. S." points out the fact that the largest mills in this country and England are using the one size of cones on all their frames. This is a poor argument, indeed. It was not so long ago that the same argument was advanced against the vertical or Crighton opener. Many mill men would say, "What else can you expect from a mill with Crighton openers?" Inclined trunk was the rage, and they were found in the largest and best mills. Was it a mistake? Sure, for you find the vertical opener now used singly, in double tandem and even triple tandem. I fought hard with my pen in those days for the return of this valuable cleaning agent. I was told then, as now that the days of the Crighton opener were past, not only down in Dixie, but everywhere. However, whether or not my pen helped I do not know, but we do know that these openers are admitted now to be the best cleaning agents.

"K. S." gets a bit more practical in the fourteenth paragraph, where he wishes to know if a flyer-lead frame has less slack in its gearing, has a better arrangement of gearing, has a different flyer and finger, if the mills using

this flyer lead can use a shorter cotton, and if they get a better production or a better price for their product. Also if the builders did not quit building the flyer-lead frame to get rid of driving the bobbins at their highest speed when full, then "what did they quit for?"

For the same reason they quit building the Crighton opener. It was only a short time ago that the defenders of the bobbin-lead frame claimed that the change in system was due to the hesitation of the bottom cone. But when I pointed out and proved that any hesitation of the bottom cone would cause slack, they now get on another tack. Now for the hundredth time I must repeat that the full bobbin speed on a flyer-lead frame is not as great as that of a bobbin-lead.

The foregoing should convince "K. S." that the question of speed condemns the bobbin-lead system. As regards the slack in gearing, "K. S." writes much against the bobbin-lead system. Let us assume that we are running two fly frames, one a bobbin-lead and the other a flyer-lead. They both have run for years and the spur gears driving the spindles on each frame are badly worn. The skew gears and spindle gears also are worn. Now in the case of the flyer-lead (having in mind the slack caused by the wearing of the gears), if the flyer is retarded or lags behind the speed of the bobbin, in each case the end will slacken, because the flyer leads. On the other hand, in the case of the bobbin-lead, if the flyer lags behind the speed of the bobbin, stretch takes place, because the bobbin leads the flyer. Are these not facts?

This is another evil that causes light yarn in spots.

The gearing on both systems is the same, but any wear or slack in the gearing does not affect the flyer-lead. The flyer can be of the same type with the presser finger having the opposite position. A mill having the flyer-lead frames can use a shorter staple, for reasons already explained. We have less pressure between the paddle and the surface of the bobbin, and as the flyer leads the bobbin, it has a tendency to take the bobbin around with it, which reduces the amount of strain on both the strand and cone belt.

As regards production, the advantage is with the bobbin-lead, for the reason that the extra pressure found between the pad and the surface of the bobbin aids to attain almost the figured twist to the inch. However, please be reminded that it is the amount of pressure at the termination of the presser finger that causes the unequal conditions found on every bobbin-lead frame. This may be "mysterious" to "K. S." so I will define "the unequal conditions found on all bobbin-lead fly frames."

Unequal conditions on fly frames means that one condition dominates the other. The functions of the presser pad on a Dunn flyer differ from those of the Bodden, hence the different outline on the bottom cone. High speed condenses the strand and more layers can be added to the bobbin. Again, the increasing diameter of the bobbin due to slow speed or fluffy stock causes the condition to become unequal as was explained.

Regarding the price of product, I am unable to say, as I have never been connected with a selling house, but I do know that the yarn made from a flyer-lead frame will break from six to ten pounds better, which means less waste and better running work in the succeeding processes. Therefore it should be clearly seen here that although the bobbin-lead has one advantage it is a great disadvantage and the cause of much defective work as I have pointed out in this department. Eeven if a tooth of twist must be inserted to equalize the number of turns to the inch for the same hank, this is more than offset by the difference in quality.

In the fifteenth paragraph "K. S." says, "Everybody doesn't know why a Ford bumps harder than a Packard." Everybody should know—there must be a vital difference in design. The difference is that on a Packard the car is longer, which increases the distance between the front and back wheel, which makes the running easier. On a Ford we have the opposite condition.

The same comparison is to be made between the flyer-lead and the bobbin-lead. The flyer rotates around the bobbin at a greater speed on the flyer-lead frame, and has a tendency of taking the bobbin around with it, which makes the running easier. On the bobbin-lead we have the bobbin leading the flyer, the strand inch by inch must be drawn past a point of pressure together with the tight tension found continually on all bobbin-lead fly frames.

Now let us turn to page 141 of the December issue, where "K. S." gets his second wind in his article entitled "Differentials and Fly Frame Winding."

In the first paragraph, he says I have not proven anything logically. If "K. S." was a practical man he would have understood. He claims I gave the boys a general mixutre of stuff. Here are some of the things I brought out that he classifies as "a general mixture of stuff."

(1). I pointed out that a special cone belting is necessary to meet the extra strain to drive the bobbin ahead of the flyer. Is this not a fact?

(2). Is it not also a fact that if the speed of the spindle will change the outline of the cone, so will its own speed? "K. S." admits this in the sixth paragraph, only he puts it in a different way.

If the hank roving is not changed and the bobbin made firmer by increasing the speed, the tension will run slack, will it not? Oh, yes! change the rack gear to remedy this condition. We do, and after doing so, the speeder tender runs the frame on one-half speed and this brings back the same unequal condition. This fact alone is enough to prove to "K. S." the fallacy of his argument that one certain make of cone will suit all conditions. Never!

(3). Has "K. S." disconnected the train of gears from the differential to the bottom cone? He will not attempt to answer the foregoing, he will answer as a whole. "K. S." should make the test, and when he discovers that he has played the role of "Rip Van Winkle," for years, let him sit down and laugh.

When the bobbin-lead system was introduced a friction equal to 900 and more revolutions was created between the differential sleeve and the driving shaft. But a close friend of mine remedied this by inserting a sleeve which is the chief advantage in making the old motion more efficient than the new.

In his second paragraph, "K. S." says he "had hoped that 'Wash' would quit bringing up these little things that do not enter into the fundamental principles of fly frame winding." In other words, "K. S." would have me understand that what I write is twaddle, simply because he knows in his heart that he is wrong, or because he fails to understand my practical logic. Remember this, it was the little things like these that convinced most manufacturers that the Crighton openers are the best cleaning agent. You know that the Crighton opener once chewed

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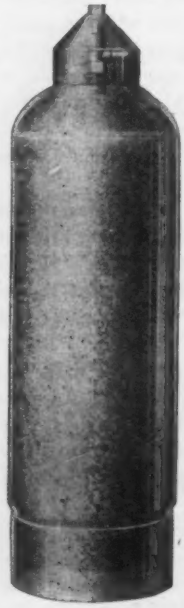

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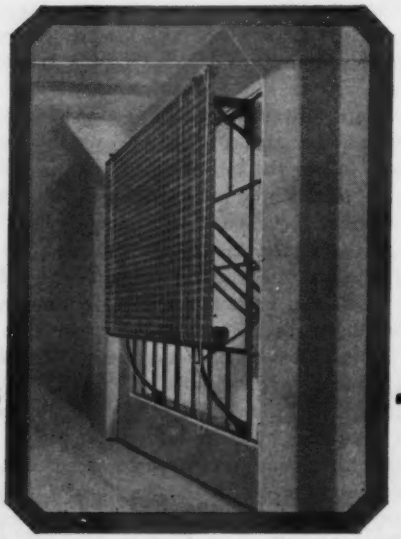

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the stock and injured the staple similar to that of the flyer-lead straining the ends when the bottom cone hesitates.

"K. S." proves here that he has no monopoly on wisdom when he claims that he will answer my questions as a whole, for there is only one question, that of winding. But in my case the difference in the speeds, size of flyer, etc., do not enter into the fundamental principles of fly frame winding. Newton's Law governs the whole thing,—the textile schools should take notice.

In the same paragraph, "K. S." continues, "All the fundamental principles that enter into fly frame winding have been proven long ago by the results obtained." By what results? Strained work? Stretch, stretch takes place in every set of roving made. And by cone-driven fly frames, too. I would like for "K. S." to explain the cone-driven frame, how it is possible, and how it works.

Continuing, "K. S." says, when the sun gear stands the spindles and bobbins revolve together. "Thus it will be seen that all that is required of the differential, cone belt, cones, etc., is to furnish enough power at a variable speed to wind the roving on the bobbin." The variable part of it does not reduce the power, does it? Now if the cone belt at its highest speed is one-fifth as fast as the main belt, and does not have one-tenth as much work to do as the main belt, then why does the cone belt wear one-fifth faster and not last one-tenth of the time the main belt does? Is this logical enough?

I wish "K. S." would reply to the following questions. Remember all the boys are waiting for action and want facts in this friendly discussion:

(1). If the power to drive the bobbins is slight, why do we have special cone belting on all frames with the bobbin-lead system and not with the flyer-lead?

(2). (Answering paragraph four): If a derrick is hung up with 15 teeth on the drive pinion and 120 teeth on the large driven gear or sun gear, will the foregoing be more efficient as regards reducing the power to drive, if the derrick is hung with 23 teeth on the drive pinion, and 30 on the large driven gear or differential sleeve?

(3). Why does the botton cone revolve in the opposite direction to that when winding-on when it is raised at doffing time?

(4). Can it be proven that there is such a thing as a cone-driven frame?

(5). Are the outlines of the cones the same in the two systems? Please explain fully.

(6). If we disconnect the train between the bottom cone and differential sleeve, the differential sleeve will rotate in the opposite direction to that when winding. Where is the power derived from to check this sleeve from rotating in the opposite direction and change it to the same direction to that of the driving shaft?

(7). Why must we have special cone belting in case of the bobbin-lead (regardless of the type of differential or compound) and not with the flyer-lead?

(8). By having the flyer rotate around the bobbin at a greater speed, is this a help to the cone belt?

(9). On all differentials, we have two sleeves. The gear of one sleeve is either on one side or in the center of the periphery. So the power to drive the bobbins must come from the opposite sleeve. If the power to drive the bobbins is not the cause of forcing the bottom cone to revolve in the wrong direction at doffing time, what is?

"K. S." states in the thirteenth paragraph that the cone backing at doffing time shows less friction. Then "K. S." must admit this, that it is surely not a cone driven frame when it revolves in the opposite direction? The bottom cone on every bobbin-lead frame will do likewise.

This is not a bad dream. Wash (R. I.)

How Should Mote Knives Be Set?

EDITOR COTTON:

Being an interested reader of your magazine, I have noted the several discussions between "Wash" and others as regards card flats, lickers-in, etc., but none of these fellows seems to have anything to say about mote knives; that is, what angle they are set to, how many there should be and how close they should be set to the licker-in. I would be very much pleased if some of these fellows would give their opinions through the columns of your paper.

W. H. J. (Mass.)

[Boy, Page "T. A. D. (Ga.)!"—Editor.]

Cotton Manufacturing In China.

(*Continued from page* 274.)

American mill experience, Mr. Burton secured an excellent composite view of Chinese conditions and Chinese needs, and a brief, general survey of Chinese mills, the conditions, practices and needs of the industry in the Orient is presented in the following paragraphs, prepared from an interview with Mr. Burton on his return to this country.

Shanghai, the gateway of the Orient, is probably the largest cotton manufacturing city in the Far East, and if not actually the largest, the important additions to exising plants and new mills in process of erection and contemplation, will easily make it the Orient's largest cotton manufacturing center. It is situated on the banks of the Whangpoo river, about 14 miles from where the river joins the Yellow Sea at Woosung. The country around Shanghai, and in the city itself, is extremely flat, practically at sea level, examination of the soil showing a clear, silty formation left by the sea years ago.

The climate is very peculiar, at times getting very hot indeed, at other times being very cold—a sort of penetrating cold that seems to chill a person through, yet the thermometer may not show a decided drop. This is due to the excessively humid conditions that prevail, a cold clammy dampness that seems to chill a person through. In summer this humid condition is also present, and until one becomes accustomed to it, is very unpleasant.

Shanghai, therefore, on the basis of climate, is not especially attractive to cotton manufacturing, but it is a city strategically located as to distribution, and the city is the seat of a tremendous business. North China, from Nanking north to Tientsin and Pekin, presents a climate more favorable to yarn manufacture, but policial chaos, internicine strife, and lack of the means of distribution in the form of good railroad facilities, have hindered cotton manufacturing development in that section.

In the North China city of Tientsin, and its surroundings, however, there are some very good mills, from the Chinese standpoint. Here the climate, while showing high humidity at times, has a much lower average humidity than Shanghai, and in winter it becomes very cold and frosty. Yarns spun from exactly the same kind of cotton will show at least 10 per cent more breaking strength when spun in Tientsin as compared with Shanghai, and on exactly the

same kind of machinery, due entirely to the difference in climatic conditions.

There is a vast difference in labor conditions as we know them here in America and in China. While labor is abnormally cheap in China, yet it costs practically as much per pound to spin yarns in China as here in America. This is due to the very large number of Chinese workers required to do the work that one American worker would do. In the very best of Chinese mills the ratio is at least 6 to 1 as compared with American labor. It is common, very common, to see two and three spinners to one side of a spinning frame, and the Chinese labor employed in a mill of say 50,000 spindles would make quite a good sized army.

ARTHUR L. BURTON. CHIEF ENGINEER.
PAO CHENG COTTON MILLS.

Chinese mills generally run day and night and employ two shifts of workers, working 12 hours a shift. Usually these mills stop 12 hours on the 10th day to change shifts. This is called the Chinese Sunday by the workers.

Local Chinese cottons are used to a great extent by these mills. Some Indian cotton is used, a large quantity in fact, and some American, but the percentage of the latter is low when the total amount of cotton used is considered. Chinese cottons are planted and grown in a very haphazard fashion and there would be great opportunities for scientific cotton growing methods in China were it not for the upset political conditions in that country. Robbers and bandits, composed largely of ex-soldiers dissatisfied through getting no pay or food, comprise the majority of these bandits, and they surely make life miserable for the poor farmer. Cotton is taxed here and there on its way to the markets, and sometimes the farmer is robbed of his hard earned dollars after disposing of his cotton.

The majority of Chinese mills, while nominally in Chinese territory, are practically on the borders of the foreign settlements, and partake of the benefits of protection that this close proximity affords.

The more successful mills in China are those either owned or controlled by the Japanese. There is a peculiar psychological reason for this. When the Japanese own or control a cotton mill in China they install a Japanese staff all the way through. No matter what a Japanese may be in other respects, he surely is loyal to the manager of his mill. They all work together in the handling of Chinese labor and consequently are successful.

This spirit of cooperation does not exist among the Chinese managements of mills. The staffs of Chinese mills do not give the same service and loyalty to their Chinese manager that the Japanese give to theirs because of their mild but polite contempt of each other, and they have a distinct tendency to put off until tomorrow the things that should be done today. Consequently one does not see the same efficiency in Chinese managed mills that he sees in the Japanese managed mills, where a better system of efficiency is demanded and obtained. The Japanese for some years have been getting a strong foothold in the cotton manufacturing interests of China, and notwithstanding the fact that the Chinese does not love the yellow brother from Japan, the Japanese are in China to stay. They work quietly, silently, but surely, and are a power to reckon with in China.

China's possibilities are amazing. The high price of cotton there, the excessive poverty of the people, and the low price of cotton yarns are exercising a baneful influence over there at the present time. This condition, coupled with the internal political chaos, makes for a very bad situation indeed, but if the time ever comes—and it surely will—when China will have a settled and loyal people and government, there will be such a business awakening as has never been experienced. There are tremendous deposits of coal, iron, dolomite, etc., to be exploited, a vast amount of labor that needs only intelligent training, and when the country opens up in true fashion, it will become a wealthy nation. The exploitation of these resources will put a few more coppers into the pockets of China's millions daily, the buying power of these millions will be immense. That will be the time for the installation of power looms on an unprecedented scale. At the present time the poor element of China—who, by the way, form the large majority over there—are too poor to buy the cotton cloths they use as clothing. Their women folk weave their own goods on the hand loom, a slow, tedious process, but exactly in line with the poverty of its people.

China needs railroads, and they need these railroads run properly, without "squeeze" which is one of the curses of China today. As a prominent Chinese once said, they need very strong men, "a Teddy Roosevelt" (the words he used) and China would become a wonderful country. The cotton manufacturing business is there to stay.

In further connection with the foregoing comments, the article on "Chinese Cotton Mill Practice," by Ben Y. Lee, beginning on page 275 of this issue, giving a detailed composite picture of methods and conditions in Chinese mills, will be of interest.

KNITTING SECTION

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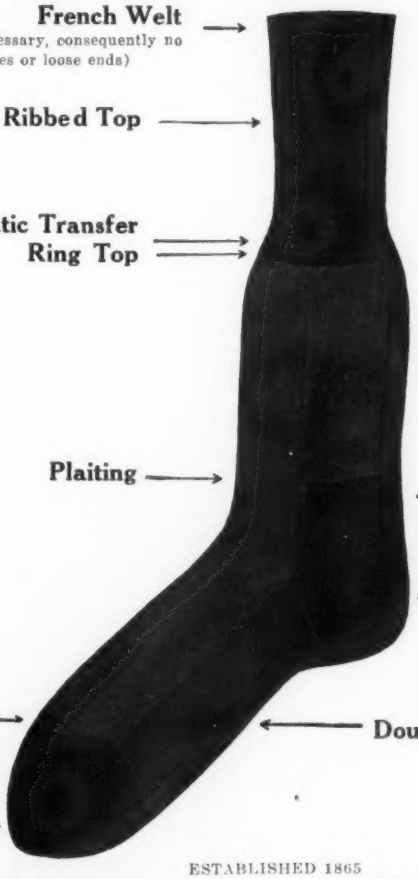

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Ladies' Knitted Vests

BY WILLIAM DAVIS, M. A.

The manufacture of intermediate and under garments for ladies' wear forms a most important branch of the business of many manufacturers, for these articles are always required and constitute an indispensible part of the clothing economy. The knitted vest is usually worn next the skin but closely allied to this garment we have the camisole, bodice, spencer, etc., which are closely related to the vest in the method of manufacture and general style of arrangement. The demand for this class of knitted article is steady but of late years it has been given an enormous stimulus by the changes of fashion in outer-garments. In recent seasons, the prevailing vogue has been for the dress to be cut low on both back and front and this meant that the ordinary style of high-necked vest for ladies' wear was showing above the dress which had to be avoided at all costs; it is quite feasible and possible to have the low cut vest worn under a high neck outer garment, but the reverse should never occur. Many of these vests were usually made with a fairly low cut neck at the front but when fashion swung round and decreed that they should be low at the back as well, revolutionary thoughts began to fill the minds of the knit goods manufacturer, for he had to revise his pre-conceived notions of manufacturing these essential undergarments. Wearers having the usual style of garment were unable to makeshift with those cut high at the back of the neck and to the great joy of of enterprising manufacturer an enormous demand sprung up for this type of article.

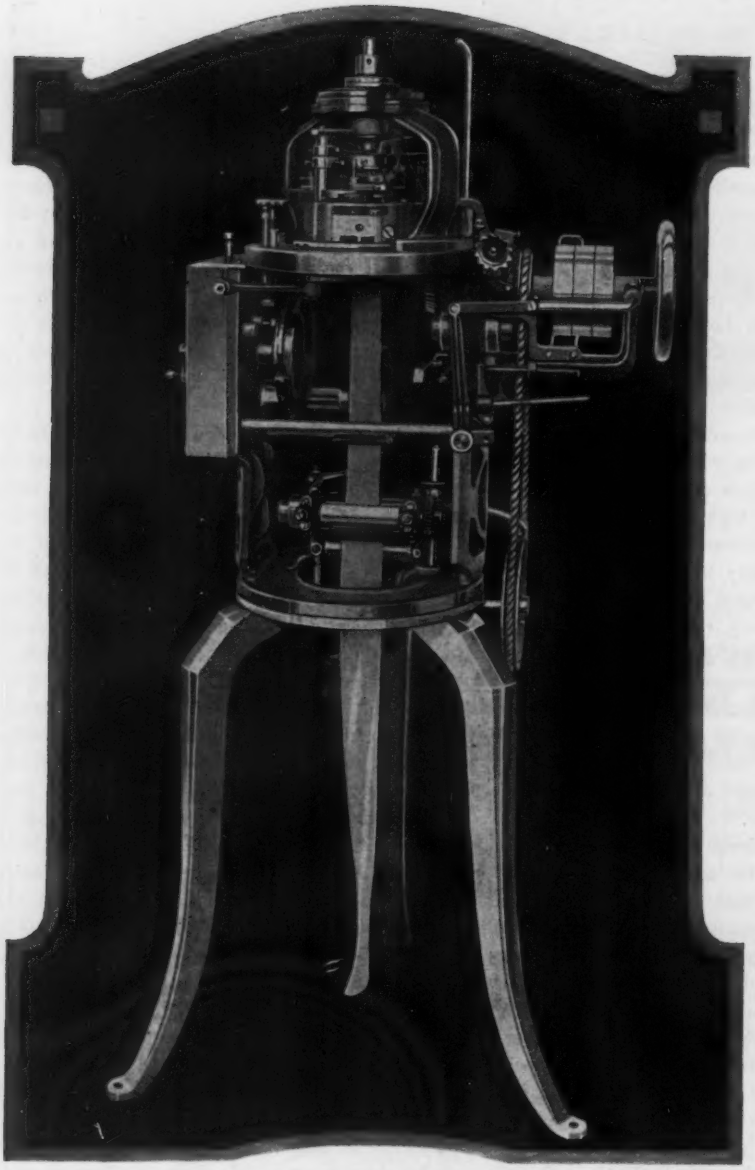
Now if you cut a dress low at the front and also at the back you remove the upper part of the article almost entirely and this is what has happened with the present-day undervest as worn by ladies; at the top it has now neither front nor back and so all that is required is a strap connecting the front and back pieces and fitting over the shoulder to retain the article in its position. This considerably simplified the process of manufacture as the shape is more easily produced and there is considerable economy in material; wearers were actually paying as much or more for less weight of material because of the advantage of being in the latest style of the moment. On the other hand the manufacturer has had to make special efforts in the direction of providing more ornamental edgings for the article and for this purpose many varieties of imitation lace effects, Merrowed edging, and ribbon insertion have been devised which are raising this class of garment into a most important feature of the underwear of the lady.

These articles have a further advantage in being loosely constructed at the top so that extra provision does not require to be made for the busts, which in ordinary undergarments account for considerable loss in production. In the cut garment trade a slit is made on each breast of the garment and a square of extra fabric is subsequently seamed in to provide the extra width for the busts. This is necessary when the material is in the plain stitch. In other cases, the article is made in two pieces, one piece for the back and a fuller and broader piece for the front so that the extra material is provided at the bust and the fabric is shaped narrower for the waist. When making these articles on the "Cotton's Patent" system, the busts are inserted by widening and narrowing at the part and by the latest seamless bosom frame when the pockets are worked ready on the machine without any necessity for further joining, there being only the shaping marks along two lines in the bust portion. The latter method is by far the most perfect and has been adopted for vests and all classes of ladies' undergarments; the only drawback is the fact that the frames for doing the work cost such an enormous price that only the old-established firms can afford to install and run them. The price of such goods is also correspondingly high so that only the wealthy classes can purchase them.

The garment for the masses, as the saying is, has to be made generally on a more moderate principle of outlay and today one of the most popular methods of making vests is by means of the circular knitting machine, of which the "Wildman" vest machine is an example. This does the work very efficiently and it commends itself owing to its large production and smooth running. The outstanding principle of making vests by this method, which is world wide, lies in a very interesting fact regarding the various widths at which different makes of knitted fabrics lie on leaving the machine. The plain stitch generally contracts from 10 to 25 per cent of its width in leaving the needles of the machine, this depending on whether the material has been worked slack or tight on the needles. In the case of ribbed fabrics the contraction is greater being more often in the region of 30 per cent. This is not considered "dead" contraction, but the fabric merely holds this extra material to be used if required by the exigencies of the body dimensions of the wearer. The rib fabric in itself is warmer than the plain stitch, and when lying normal is practically equivalent to a double fabric.

The rib stitch can be made heavier still by two devices, either the stitches in the dial are made to tuck, that is knock over their stitches after every second course, or this may be done on the upright needles in addition so that both sets of needles are holding their stitches for discharge after every second course of loops. On the machine referred to the alternate knocking over is only done on alternate rows of loops in the *dial,* the upright needles throwing their stitches over every course. The general structure of the machine is for 1 and 1 rib and attachments are made to the machine whereby the cams operating the needles in the dial knock over their loops at every second course and what is very important, is that a chain can be constructed to determine the length of plain rib and that of the tucked portions respectively. This improvement at once opened up wide possibilities for the ladies' vest trade and the production of these vests is today conducted in every textile manufacturing country on the system described.

The principle of varying the width of fabric according to the stitch enables the tucked portion to bulge whilst the plain ribbed part contracts and this is precisely the condition required for the vest where the upper part should be wide and in the half-cardigan tuck stitch for the bust which gives extra warmth and width as well; while the



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lower portion in plain rib stitch contracts so as to fit the waist. This valuable principle enables the articles to be made on the machine in long webs, so that a wide part and a narrow part together make a vest and they are cut off in this way and trimmed ready for wear. When machines are built in body width we are provided for the vesting trade but the making of surgical or body belts is largely conducted on the same principle. When the machines are made narrower, we obtain "sleevers," where the sleeve proper is worked in the half-cardigan stitch and the plain rib is re-introduced at the cuff to give the essential contraction. In some cases this contraction proves a disadvantage as it is too pronounced so that towards the end of the cuff about half an inch of the broader tuck rib material is introduced to give a fuller finish to the rib cuff.

Much of this trade was formerly done by European manufacturers, particularly those of Saxony and Switzerland, the Swiss vest being famous in the trade the world over on account of its cheapness and excellence of finish and trimming; but during the past few years American manufacturers are making these articles in increasing numbers and the same can be said of the knitting concerns of the United Kingdom, so that the monopoly of foreign firms is being broken.

Having introduced the subject in a general way it may be desirable to outline some of the practical methods of producing these various classes of vests, beginning with the simplest articles which are worked in plain stitch on the ordinary latch needle knitting machine which is in the equipment of most makers of knitted goods. The ordinary form of latch needle machine is employed, 19 inches wide being a standard with 8 feeds, but it often happens that a much higher number of feeds is employed as many as 16 or up to 42, but with the higher feed numbers the danger of irregularities of stitch increases and unless the fabric has to be well brushed on the surface to obscure these, the articles will appear of poor texture. While many of the higher feed frames produce excellent texture, yet most manufacturrs who desire to sell good quality goods, prefer to keep to lower feed numbers which give regular fabric of good texture and skin.

The gauges vary, but for general wear we may mention that of 9 to 12 needles per inch as being suitable, the goods made by the writer on his machines are all knitted in machines having 11 stitches per inch and the counts of cotton yarn employed is 8s American. This gives excellent fabric when worked with about 14 courses to the inch in the machine, and the 19 inch diameter machine provides for the normal trade, while the 26 inch machine will yield good results with the larger sizes. The quality of cotton used is such as will give a good grip to the card clothing in the raising machine, for these fabrics are raised on the underside to give a soft feeling to the skin of the wearer. Regarding raising on the face this may be done slightly but in recent seasons there has been something of a set back to this system of finishing on account of the highly inflammable character thus imparted to the texture, and the large number of injuries by burning which have occurred as a result.

Having secured the fabric in rolls from the finisher it is handed to the cutter to be carved into the vests desired and success in this trade depends largely on the skill with which cutting is carried out, because undue waste in material may easily bring the manufacturer out on the wrong side. This depends also on the perfection with which the fabric is knitted on the machine, because if the machine is giving constant trouble in pressing-off causing bad pieces to be made in the web, then these pieces have to be cut out. While a good cutter may manage to cut round these, increase of waste is always the result. Many of our knitting machines are still rather slow in the action of the stop motion during knitting; if the thread breaks or runs done on the bobbin, the machine should stop before the yarn gives out on the needles, but in practice we still have a large number of press-offs due to this cause. When even a portion of the fabric is thrown from the needles in this way, it has to be "bodged" on instead of threading the stitches on to their needles one by one and a blemish occurs right across a line which has to be avoided in cutting.

The next step is to provide standard shapes to which the garments have to be cut and although the actual shapes

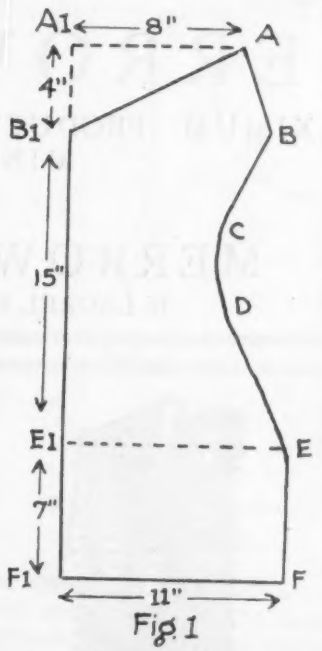

Fig. 1

cannot be reproduced here, an endeavor has been made to provide these by means of illustrations drawn to scale and to which actual measurements are given. Fig. 1 represents a shape used largely as a standard for the vest and this is arranged to be cut from the web which lies about 22 inches wide finished, the shape is 11 inches wide so that two articles can be cut from the one width exactly which is the correct thing if economy is to be practiced. To cut this width of garment from web 24 inches wide or wider would cause considerable waste pieces to be left.

The shape shown should first be drawn to measure on stout paper and afterwards transferred to strong milled board and hung up in workroom handy for frequent use. If any shape and size proves a bulwark to the firms' business, then the cardboard shapes may be made still more permanent cut out of metal. Fig. 1 gives a shape for a ladies' vest where the article is made with two such pieces both cut on the double fabric. The right side indicated by the letters A to F is cut from the outside of the web, whilst the straight line indicated by A1 to F1 is cut along

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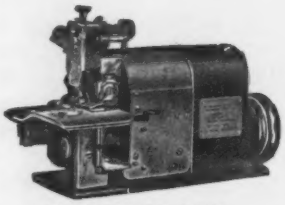

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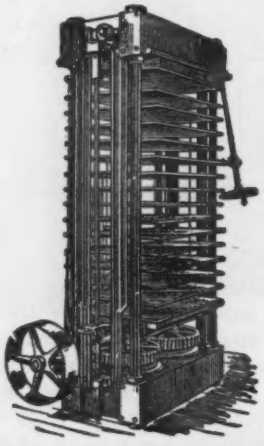

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the center. In this way we obtain another piece which is used for the left side of the article, with the piece shown as the right side. The part E F will be continuous in the circle web, but as the piece has to be cut out to the waist shape as shown by the letters E D C and B these severed pieces will afterwards have to be seamed together again. In joining the two body pieces by this system, there will be a seam along the front and along the back in the center of the body. On the left of the shape at A1 B1 a dotted piece is cut out for the low neck, the part at B is open for the entry of the arm, there is in this case no sleeve, the armhole at B being merely bound round with overlocking or ornamented by insertion or lace about one inch in width. The part from E to F is the wider portion as required for the seat, but in some cases this can be omitted or shortened if a shorter vest is desired. This may be done by stopping the shape at the line E E1 and this will cause the article to stretch to the top of the seat only. Some modification may also be made at the neck portion and frequently the fabric is first cut out along the top of the dotted line A1 A and the neck cut on the front afterwards by the girl operator as required by the style. If the neck has to be low on both back and front the two pieces may be produced at one and the same time by cutting to the shape shown. For general wear, the neck is high at the back and somewhat lower at the front which necessitates a further incision at the front after the cutting proper has been performed. If the cutting has to be done with dispatch it is essential to devise shapes which can be laid on a large pile of fabric and dealt with by running the circular electric cutting machine round it. In actual practice the shape itself is not used during cutting, for a more convenient way is to run along the outline of the shaped board with a colored pencil on the top fabric which acts as the guiding line to the operator in manipulating the cutting machine and a pile of fabric a few inches in thickness may thus be dealt with simultaneously with great advantage to production. When the shape cannot be cut on the double then modifications as between the back and the front have to be made subsequently by hand by the operator, a young girl apprentice being quite suitable for this work.

When the pieces have been cut out as shown the seaming takes place along E D C for the right portion of the waist and along a corresponding line for the left portion, the part from E to F being perfect fabric as in the roll. Further seams will be required along the line F1 to A1 on the back and F1 to B1 on the front. The seaming is usually done on the well-known Flatlock machine, the introduction of which was undoubtedly the means of placing the cut-up knit goods trade on a much higher plane. Without doubt it has proved an epoch-making invention and has contributed largely to the spread of the popularity of knitted undergarments and has brought their use within the reach of the millions. Large numbers of such garments are worked in bleached white cotton and white cotton threads are used for seaming but when made of wool they are often produced in a lightly tinted natural. In this case a thread similar to the ground of the garment should be employed, preferably a little lighter than the ground as this tends to obscure the seam. The present day manufacturer however will not achieve much success in this branch of trade if he does not employ the newer attachments to sewing machines for ornamenting the garments at such conspicuous parts as the tops of the necks, the sleeves and along the bottom and some of the most best selling machines are those which can give novel effects by producing not only an overlock seam round the edge of a cut garment to cover the frayed character of the knitted stitch, but actually add a species of trimming in a material akin to that used in the ground.

The measurements are indicated in Fig. 1 where the width at the seat is the greatest about 11 inches, at the waist this is reduced to 8 inches which is the same as that of the neck at the line A1 A, from C to B the width increases to the shoulder pieces and this extra material is useful in giving width for the busts at this point. If the busts are not made into the garment as extra pieces, the material has to be drawn from the body portion in some way. As has already been indicated many of these articles stop short at the line E E1 just at the bottom of the waist and the top of the seat, as many wearers prefer to have them

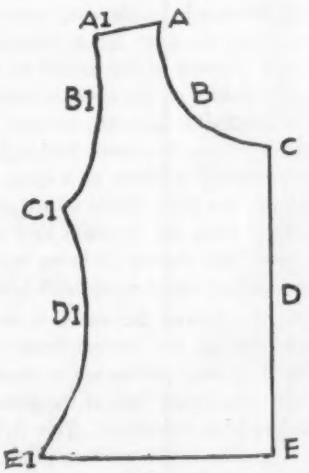

Fig. 2

thus. This depends on what is used for the nether garment, as too much overlapping of material should be avoided. In regard to overlapping it is admitted that the best results are to be obtained from the union suit as the garment is then continuous and in one piece. The long form of the vest however is a very warm article particularly for winter wear and is quite simply manufactured and seamed together.

In considering this trade reference must be made to one or two modifications which are possible and customary. Fig. 2 will illustrate some of these in detail, in this case the piece illustrated is that of a left hand cut, that is the material is excised from the left half of the web and this is cut on the double fabric as before. It is taken from the same width of fabric as before, but the shorter form of the article is given coming down to the waist only. The general appearance of the shape is the same as Fig. 1 except that the neck and the sleeved portion is different. The neck portion is indicated by the letters A, B to C, whilst the sleeved part is given by A1, B1 and C1, the front of the article is given by the letter D, whilst the shape for the waist is shown at D1; the article terminates at E1 and has a length of about 20 inches, while the width at the bottom is 11 inches with corresponding reduction for the waist. To finish the garment requires another piece the image of

that shown, cut from the opposite side of the web and the two pieces are seamed along the center at back and front; the edges on right and left are seamed to each other to the top of the waist, leaving of course the parts marked B1 for the sleeve openings, also the part B for the neck opening. The piece of fabric across the top marked A1 A is also seamed and this rests on the shoulder of the wearer. If short or long sleeves are wanted with this garment, these are cut out separately on the double so that a seam is made along the underside, whilst they are inserted or added to the garment at the armhole along A1 B1 C1.

The neck portion in this shape Fig. 2 should be particularly noted as this is the point which has varied most in recent seasons; if the cut is made as shown on the double fabric then the article is low both on back and front of the neck, should this be avoided the double fabric is higher and an extra piece subsequently removed from the upper layer. This has the effect of making the garment high at the back and low at the front, but for ultra-fashionable wear the low cut vogue is allowed on both back and front and the style may be made even more exaggerated than that shown with the part A1 A reduced to a mere ribbon acting as a support to the article at the shoulder. In making the latter style on the circular knitting machine we may truly economize in material, because the fabric is not continued farther than the sleeve bottom, and a ribbon or band extends over the shoulder as a strap. In the circular trade however, the finer details of shape can only be obtained by cutting from the flat web and as such small curved pieces have little chance of being used in another part of the garment they count as so much waste .

In regard to the sleeves, for summer wear vests are frequently made without the sleeves being inserted, but for winter wear a strong preference is shown for short sleeves which cover the upper half of the arm and with the rib top extended to near the elbow. This style gives complete freedom to the wearer in work or play, but a certain proportion of individuals unfortunately prone to rheumatics in the arms ask for the full long sleeve. In this case it often happens that the bust portions are tightly drawn as the insertion of the sleeves makes the shape smaller. When no sleeves are inserted the article can adjust itself by being drawn at the top. If modifications of this kind have to be made on the shape, the front part is given on the shape and the variation on the back part is indicated by a dotted line.

One further word about the trimming. Many manufacturers still practice the system of obtaining cotton lace or material worked in mercerized cotton and add by the lace-attaching machine which gives a very level seam at the join. Such trimming always appears "added on," it does not strike the observer as being part and parcel with the garment and enterprising machine firms have specialized with mechanisms and attachments to their machines which produce imitations of lace patterns by gathering the threads together at short intervals to give shell-like effects; some machines even thread dainty ribbon through openings so formed by means of which the top or neck of the article can be drawn together and the garment thus made more becoming. In this way the top of the garment can be made wider to start with to allow roomy busts, whilst the part at the neck can be drawn together by means of this ribbon and the effect is quite elegantly staged.

In this trade above all others, success lies with the man who can devise tiny touches of daintiness which catch the eye of the lady wearer.

Federal Tax Laws.

Answers to many problems which may vex the individual and business concerns in making up the annual income tax returns this year are furnished by the 1923 edition of "Practical Questions and Answers on the Federal Tax Laws," just issued by the Irving Bank, New York.

The book, which has been published as an annual for several years, has an unusual value because of amendments and provisions in the Federal Income Tax Law which became effective first on incomes in 1922. It consists of 144 pages divided into three parts. The first section includes a review of changes affecting returns for the first time this year. The second section covers in Question and Answer form a wide range of knotty problems. In the third section is printed the complete text of the law with amendments. The book has been prepared by experts on income tax laws and is authoritative.

INDUSTRIAL ORGANIC CHEMISTRY. By Samuel P. Sadtler, Ph. D., LL. D., and Louis J. Matos, Ph. D. 707 pages, 141 illustrations. $8.00 per copy. J. P. Lippincott Co., Philadelphia, Pa.

This new publication is a fifth edition of Dr. Sadtler's book, the first edition of which was published a number of years ago. In the preparation of the present edition, however, he has had associated with him Dr. Matos, a chemical engineer of many years' experience in the textile and dye industry, and now connected with the National Aniline & Chemical Co. Dr. Matos has taken the entire responsibility for six chapters of the volume, covering textile fibers, vegetable and animal; coal tar distillation and its products; dyes, both artificial and natural; together with bleaching, dyeing and textile printing.

The National Aniline & Chemical Company, Inc., has announced that the semi-annual Dyer's Formulas booklet issued by this company is now ready for distribution, and will be sent upon request to any of their branch offices. This edition contains formulas for matching the shades authorized by the Textile Color Card Association for the Spring of 1923. Detailed instructions are given for obtaining the designated shades on skein silk, cotton, wool and leather; and in each case the method of preparing the dyebath with the requisite percentages, is given.

Comtelburo, Limited, with American office at 71 Broad St., New York City, have produced the 52nd edition of their "Annual Cotton Handbook," extensively used in this country for statistical reference. A number of new features have been included in this edition to make it more comprehensive, and, as usual, the regular features are on the same plane of completeness and accuracy which has made the book popular in the past. The price is $1.00 per copy in cloth binding.

A recent addition to the underwear division of the knitting department at the A. French Textile School, Georgia School of Technology, Atlanta, includes a body machine and a sleever, installed by Scott & Williams, Inc., 366 Broadway, New York City.

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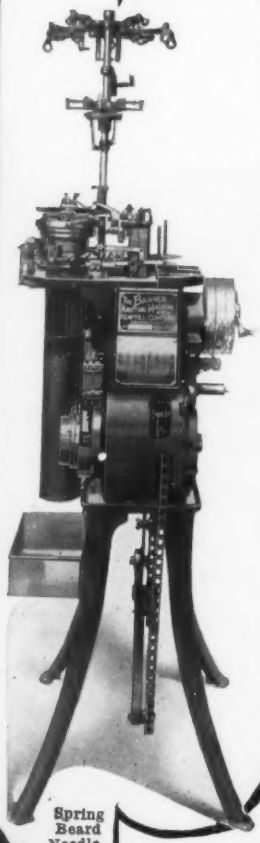

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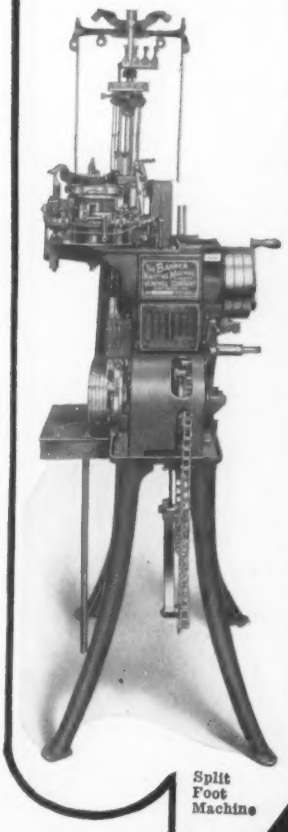


Split Foot Machine

HEMPHILL COMPANY

MAIN OFFICE AND FACTORY PAWTUCKET RHODE ISLAND

TRADE MARK

SOUTHERN OFFICE and SHOW ROOMS 912 James Bldg. CHATTANOOGA, TENN.

PHILADELPHIA OFFICE and SHOW ROOMS 208-9-10 COLONIAL TRUST BL'DG PHILADELPHIA, PA.

To Blueprint

YOU confer a favor upon the Knitting Machine Builder, the Needle Builder, and YOURSELF every time you order needles made "to blueprint."

Less trouble with machine adjustments—less trouble in getting needles like you last received—better deliveries—more even fabric and less waste if you say "to blueprint" when you order.

Before insisting upon special needles see first if there's a blueprint needle that will fill the bill.

WHEN you specify "Excelsior" on your knitting needle you accept the judgment of many knitters who have been specifying in this way for more than a quarter century.

THE TORRINGTON COMPANY

— EXCELSIOR PLANT —

TORRINGTON, CONN.

The Knit Goods Market

Something of the old time January interest in knit goods in the primary market was manifest last month, with buyers present in greater numbers than for possibly two months. The annual meeting of the National Wholesale Dry Goods Association in New York during the week of January 15 necessarily brought buyers and other representatives of many of the leading northern and western houses to New York, as well as to mills in Philadelphia selling direct to the wholesale trade. For some days before the meeting there was considerable shopping around by smaller jobbers who apparently were impelled by a desire to get in before the rush that was looked for with the coming of the bigger fellows.

It seemed to have been the settled conviction that prices which had been named were destined to stick, and that, as cotton continued to move up, prices of cotton goods would be advanced. As was to be expected, the usual intimation was given that if advances were made on hosiery, buying would be very much retarded, and the impression prevailed in some quarters that jobbers, generally speaking, had enough hosiery in stock and on order to see them through until near the end of April. Hosiery buyers were more interested in price than the immediate acquisition of additional spring goods, while in underwear there was a show of genuine activity.

Underwear for fall was being contracted for on a very liberal basis. Several mills which had sold at prices slightly above those of early December withdrew their lines temporarily, pending upward revisions.

Sweaters for fall had been sold in a larger way than really was looked for at the opening, when, it was feared, the higher prices of wool goods would not be acceptable, and leading mills continued to book a fair volume of business. In a broad way, therefore, the knit goods market got off with a very satisfactory start, with all interests bullish for the first half of the year and confidence running stronger on the outlook for the second half, with the raw material markets firm and tending higher.

Competition in hosiery continues keen, and while there is good demand for low end goods, prices are inadequate, due to the eagerness of manufacturers having a slight advantage in the possession of yarns to keep help employed.

It is an open secret that many manufacturers were disappointed with the showing in their inventories for last year. Maximum production was relied upon for a shrinkage in overhead, and mills went along on the assumption they were piling up greater profits than their inventories show. They had sold their output, but too close to production cost, and at the outset it appears that this year will show no improvement in the returns from staples. In fact, it looks as though some manufacturers still are banking on volume rather than profits, and may be said to be suspected of inviting bankruptcy.

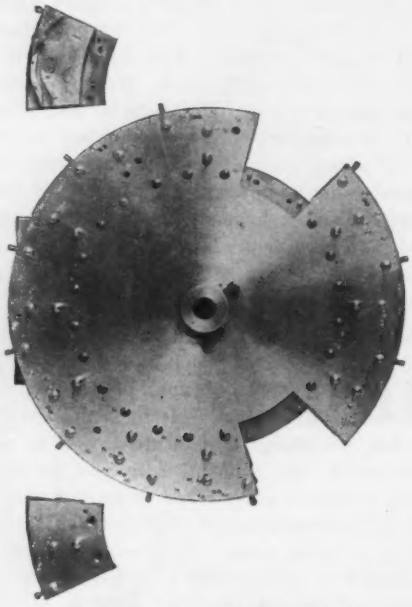
In the primary market the question frequently is heard when spectacularly low quotations are named, "How can they do it?" A jobber in Ohio recently was advertising 220-needle all mercerized half hose at $1.85 a dozen, in contrast with $2.45 for standard socks of light gauge from other mills, a price at which several are sold well ahead. How the Ohio jobber manages to find a line of this class of goods on which he can operate at even a slight margin is perhaps explained in the advertisement of a Philadelphia department store, which undertakes to make it clear to the consuming public why it can offer bargains. "Go to a manufacturer," the advertisement states, "and ask him to make for us a given lot of goods at a figure which we name, and he would laugh at us. But this manufacturer or some rival has goods in stock, a work force to keep busy, rent to pay and obligations to meet. He finds selling is slow and that there have been additions to the cost of materials he may have owned and the cash outlay for labor. He must raise money, so, while he may not be able to get out of his goods what he put into them, he will let them go in an emergency, and it happens that what he could not sell profitably at a given figure he will dispose of at a sacrifice. We have the money; he has the goods and wants money; so we manage to get the goods under the market."

While the foregoing was written for public consumption there is in it as much truth as "bunk." And it so happens that hosiery made from yarns bought, say, in September, basis of 34 cents, often is available to shrewd buyers at the then value, notwithstanding identical yarn is costing the manufacturer 7 cents a pound more. By the time the manufacturer is getting prices based on present yarn costs he probably will be confronted with a situation not unlike that which he is facing today. Not for a long time have mills sold hosiery on replacement value. Distributors get the advantage of the risk taken by mills in contracting months in advance for their yarn.

One of the better informed southern manufacturers while in the north recently stated that, leaving yarn out of consideration, there had been an increase from July to December of two cents a dozen in the cost of each of several of his hosiery numbers, a part of this being chargeable to the higher cost of straw-board cartons and incidentals which crept in as expense items and which could not be escaped. During the six months his mills were operating 100 per cent of capacity, so that the overhead should have been reduced. It probably was. Had it not been cut down his increased cost would have amounted to more than two cents per dozen. He realizes that prices must be increased and admits he dreads the effect among buyers. "I hope," he stated, "that nothing will occur to make the advances more radical than now seem absolutely necessary."

There has been considerable buying of mercerized yarn by hosiery mills, so that it would appear there is a better outlet for mercerized hosiery. Ladies 220-needle are quoted by some leading mills at $2.80 a dozen, the same mills asking $3.25 for 260-needle. These presumably are the top figures. Offers of 220-needle have been made at $2.50 and below. Misses 300-needle combed ribs have strengthened and a mill which is sold ahead for as far as it cares to sell on the present market turned down an order on which the buyer was willing to pay $2.00 a dozen.

Men's and women's 176-needle hosiery is in better standing, and misses coarse gauge ribbed can be sold at 10 cents above the price of eight weeks ago. This advance is in line with that on misses combed, of which a southern mill some weeks ago had sold up at $1.75 and since has declined additional business. Another southern mill reports sales aggregating 30,000 dozens of misses combed at $1.85.



SECTIONAL CAM DIAL

This valuable feature has been added to our Nye & Tredick knitter. The Sectional Cam Dial marks a progressive step consistent with our constant endeavor to present machines which will enable our customers to cope successfully with the keenest competition.

Cleaning may be easily accomplished, cams or needles removed, bars straightened and any inspection made without a complete removal of the dial. The sections which are provided for each feed, are located with heavy dowels and securely fastened with screws. The efficiency of your mill will be increased. Machines will yield more fabric. Your knitters will be better satisfied.

Nye & Tredick quality plus this convenient improvement will create a production of enviable reputation.

TRUMP BROS. MACHINE CO.
Successors to
NYE & TREDICK CO.
Beech and Anchorage Sts.
WILMINGTON, DEL., U. S. A.

BRINTON BODY MACHINES

Plain or Automatic

Built in all sizes up to 24 inches. In all cuts up to 14 needles per inch.

You owe it to yourself to investigate this machine.

We also build all styles of Hosiery Ribbers and Knitters and various other circular machines for all kinds of knitted articles.

Samples, prices and particulars on request.

H. BRINTON COMPANY
Philadelphia Pennsylvania

While the inference has gone out that jobbers have covered for their hosiery requirements for several months, the fact remains stocks the country over are low, and it is a question whether the distributors do not already realize the need of more goods than have been contracted for. In any event, there is a very general call for advance shipments. A western jobber about the first of the year wrote to a Philadelphia mill, "If our goods for February delivery are ready you might ship them at once." Such intimations of depleted stocks are not uncommon, so that it would appear there is developing sufficient demand for hosiery to support the market when the troublesome advances go into effect.

Infants socks have been dormant for the better part of six months, but recently have been receiving better attention. One of the larger buyers who had been "nibbling" since last July placed his initial order during the second week in January. Other initial orders have been booked, some of them for fewer cases than the duplicate orders of a few jobbers who contracted a half year ago for a part of their needs. While in 1921 most of the jobbers over-bought of infants socks, there are reasons for believing they were under bought for the coming season. Prices remain about where they were at the opening, notwithstanding the radical jump in yarn costs. This may be attributed to the belief very generally held that production of infants socks, which for several years was barely adequate, now has been overdone.

Some jobbers who feared they would have much stock to carry into the present year are reported having made a total clean-up before inventorying. One house had been specializing in two numbers, one going to retailers at $2.15 a dozen; the other at $2.65. After all of the lower price numbers had been disposed of retailers were calling for more goods, and the jobber, looking to a favorable inven tory showing, let the higher priced number go at $2.15. His trouble began later, when retailers, appreciating the difference in value, flooded him with orders for more of the better sock at the price of the cheaper one. But the jobber accomplished what he started out to do—cleaned up—and as the 1922 prices were lower by considerable than what he paid the year previous, he was able to come back to the market and replenish for the current season at a price which nets him a slight margin on the goods which he had sacrificed.

For many mills silk hosiery has been proving a troublesome proposition, with raw silk going higher and prices of stockings lower. The retail trade insists on buying an all-tram silk boot seamless stocking at a price making it a $1 seller at the counter. Such a price is possible, but the stocking is impossible. A silk stocking fit to wear cannot be made to retail at such a price, but, as the market is pretty well supplied and manufacturers are doubtful whether the raw silk market can hold, goods from distressed stocks are available. A mill selling to retailers direct is putting out a fairly good stocking to be sold to the consumer at $1.25 a pair.

Seamless silk hosiery has had to compete very sharply with hosiery of its class made from silk and artificial silk in twist. One mill is quoting $6.65 a dozen for such stockings of standard boot, subject to a trade discount, supplying a stocking of good appearance which can be sold profitably at $1 a pair. Prices of other mills range from $7 to $7.50. A few mills specializing in half hose of silk and artificial silk in combination are sold well ahead and have profited handsomely by turning to this class of goods and discontinuing the manufacture of mercerized and fiber silk plated on mercerized.

The use of artificial silk in combination with tram has served manufacturers well in striving for a price suggested by jobbers and retailers, and the combination in ladies full fashioned hosiery has been resorted to by some mills with considerable success. Full fashioned stockings of this fiber should be available at the counter at $1.50 a pair, in contrast with 10 to 11 thread all silk boot at $2.00 regular.

One trouble likely to confront manufacturers of the tram and art silk twist goods is a cheapening of the product. It is pointed out that this will be a very simple matter, as the quantity of artificial silk can be increased and that of the tram decreased, while maintaining weight, and obtaining luster. Cheapening by one means or another already is being resorted to in relation to seamless hosiery for ladies, as a lower price expediency, and some day there is going to be heard complaint of more trashy hosiery.

Chiffons are the better performers in the full fashioned silk hosiery primary market. Most of the mills making them are having all the business they can take care of and some are in arrears with deliveries, while manufacturers of full fashioned staples in silk have found it convenient to curtail production by increasing the number of holidays.

This is not surprising in view of the fact that some of the mills in this class are selling their goods at $1 per dozen less than when they were buying raw silk at $1 a pound under current quotations. One mill line of 12 threads which last year was selling to jobbers at $16 a dozen now is on sale at $14.50. Jobbers have said they can buy a 10-thread 19-inch boot for $12.50, which is $1 under the price of one leading mill which it is acknowledged produces as good a stocking as is on the market at its price. A full fashioned stocking made of tram and art silk in combination is sold to retailers at $12.50 and goes over the counter at $1.50 a pair, which is 50 cents under the regular price of an all silk boot and but 25 cents more than retailers are getting for a good all silk seamless.

Reports of the extent to which jobbers are operating in wool hosiery for fall are conflicting, the prevailing opinion being that not very much business in this class of goods is being placed. It all depends on what is meant by "wool," a descriptive term too broad in its application to hosiery in the class described as wool.

Department stores carried over from holidays large stocks of high priced imported hosiery of silk and wool in combination. The existence of such carry-overs may be expected to act as a bar to extensive operating in high class hosiery for fall. The public was paying anywhere from $5 to $10 or more a pair for imported silk-and-wool hosiery, but apparently did not buy as much of it as dealers thought would be taken during the holidays and, it was stated, importers in the wholesale market were receiving cancellations of orders.

Mills making distinctive lines of heathers and silk-and-wool goods not strictly in the heather class have been selling very heavily for fall, a ladies stocking to retail at $2 a pair being an especially attractive proposition. One stocking of this class is of such high character and good appearance that, while it shows a good profit when sold at $2 a pair, has been selling in some retail stores at $4—and yet retailers insist the consumer is objecting to prices.

ABERFOYLE MANUFACTURING COMPANY

MERCERIZED YARNS

MAIN OFFICE
EMPIRE BUILDING
PHILADELPHIA

ADAMS-FRANKLIN BUILDING
CHICAGO

MILLS
CHESTER, PA.

WESTAWAY BUILDING
HAMILTON, CANADA

Although wool is approximately 100 per cent higher than a year ago, it is possible for jobbers to buy one mill line at $1.25 a dozen under last year's price. Of course manufacturers have profited by experience and doubtless have devised means for reducing the number of seconds, which, in the earlier stages of combing of silk and wool, ran into very large figures.

Wool in combination with cotton has proved a very satisfactory expedient for ladies hosiery to retail at $1 a pair and half-hose at 50 cents. A heather cotton sock to go over the counter at 25 cents also was a good seller in the primary market. Artificial silk and wool, for ladies, is viewed as a good $1.50 retailer and other popular combinations are art silk plated on merino and worsted plated on cotton, both in dollar-a-pair stockings. A leading mill selling to jobbers is getting $6 a dozen for ladies worsted and cotton and $3.25 for half hose of the same fabric.

Speaking broadly, the hosiery market outlook is better than for a long time. There is less resistance of price advances than last fall, and fear of declines in cotton and wool are fading away. About the middle of January more than 10 per cent of the mills in Philadelphia were advertising for help and others displayed the help wanted device from their walls. The brightness of the picture of the future is heightened by the materially increased purchasing power due to more persons in employment and, in many industries, substantial increase in wages. This phase of the situation is perhaps best illustrated in the reports of 27 members to the Employers Association of Fort Wayne, Ind. There was an increase of 32 per cent in the number of persons employed in the corresponding period of 1919, and an average increase of 40 per cent in the gross earnings of the employees of the members reporting. Hosiery exports last year showed a gain of approximately 160 per cent over 1921 and demand for export continues good. It is noteworthy that the foreign complications, acentuated by the recent movement of French troops into Germany, had no depressing effect on the knit goods market.

While there is heavy buying of cotton underwear for next winter, it is a question among some jobbers as to what will be the effect of advances on light weights. When the Otis Company not long ago announced an advance to $6.50 a dozen on balbriggans, from $5.50, distributors thought they saw an opportunity for showing the possible extent to which the ultimate consumer may object when confronted with higher prices at the counter. This advance of slightly less than 17 per cent at the mill, it is intimated, will mean that one-third more than last year's price will be exacted at the counter. The garment, formerly sold at 75 cents, will be priced for the coming spring and summer at $1, it is stated in the jobbing trade, and fear is expressed that dealers, who must pay the increase, will be disposed to defer their purchases until in absolute need, proceeding on the theory that there will be no further advance, while the hope of a recession will be entertained.

While it might be assumed that the attitude of the public toward the higher prices will be ascertained before many of the retailers will have made commitments for heavy weights, and may prove a determining factor in the volume of duplicate business in fall underwear as well as on the initial business of those mills which but recently named their prices, the fact remains jobbers are buying heavy

weights at a rate indicating retailers have been sounded and realize that today's wholesale prices are the lowest that will be heard this year.

A central west mill, whose prices for next winter are substantially higher than a year ago, and which has canvassed but a fraction of its trade, reports that the aggregate business placed by those customers whose initial orders have been booked is almost 40 per cent more than was placed by the same customers twelve months ago. Southern mills are assured of steady operation on cotton ribbed shirts and drawers until fall, and northern mills, which were late in opening, are more than satisfied with the business that is coming through. The P. H. Hanes Knitting Co., Winston-Salem, N. C., which opened its lines on December 8th, in January temporarily withdrew its prices on suits and separate garments for deliveries March to May and shirts and drawers for deliveries June to September. During the period of this temporary withdrawal of prices, the company was offering only its boys and childrens lines of knitted underwear and nainsooks for men.

Mills selling direct to retailers report an enormous volume of repeat orders for spring, at somewhat higher prices. One of the larger manufacturers states that their January shipments are larger than for the corresponding month in any previous year, and that at the rate business had been coming in up to the middle of the month, January also would smash all previous January records for sales.

As in hosiery, the direct to retailer underwear mills have been better engaged and are making more significant sales than mills selling to jobbers, barring the large southern establishments which are booked up to possibly early fall for cotton ribbed goods.

The Universal Textile Corporation.

With the purpose of efficiently developing and further expanding the textile manufacturing industry in China under American management, the Universal Textile Corporation has been incorporated in this country with a number of leading American financial and textile interests included in the directorate.

Chow Tsuchi, former premier of China, who recently was in the United States in the interest of the new textile corporation, is named as president of the enterprise. He is connected with several large banks and industrial plants in China, and has other extensive interests in that country.

William A. Mitchell, who since January 1, 1912, has been agent of the Massachusetts Mills, at Lowell, Mass., has resigned that position and will be vice-president and managing director of the Universal Textile Corporation, having sailed for Shanghai. Mr. Mitchell will be in direct charge of the company's construction and building activities.

According to plans announced while Mr. Chow was in this country, the corporation intends to construct as an initial unit a 30,000-spindle plant near the international settlement in Shanghai, to have also 900 looms and a finishing plant. This will be constructed as a model plant, and as this progresses the organization will extend its cotton manufacturing plants further and also include in its operations the improvement of conditions in the Chinese silk industry, and will later extend itself further into woolen manufacture. While it will probably be several years before this latter phase of manufacture will be taken up actively, merino sheep are being imported from Australia to the northern regions of China. The entire scheme of development in the corporation and its properties is to be along deliberate, efficient lines.

The organization of this company brings together some of the most prominent Chinese already operating plants in that country and a number of important interests in America. Morris R. Poucher, director of E. I. du Pont de Nemours & Co., Wilmington, Del., P. E. Mann, and J. A. Thomas, are named as vice-presidents. A. J. Drexel Biddle, Jr., is treasurer and Charles T. Lark secretary. The chairman of the board of directors is J. A. Thomas, organizer of the British-American Tobacco Company, and its general manager and director, who has made a study of Chinese industrial conditions for the past 25 years. Other directors include Robert F. Herrick, Jr., assistant general agent of the Saco-Lowell Shops, Boston, Mass., Dr. Homer Gage, president Crompton & Knowles Loom Works, Worcester, Mass.; Robert Amory, of Amory Brown & Co., the president of the National Association of Cotton Manufacturers.

Chinese leaders represented on the directorate, in addition to Mr. Chow, include C. C. Nieh, of Shanghai, president of the China Cotton Mill Owners' Association; C. T. Wang governor-general of the Shantung Railways in Shantung, and president and general manager of Hua Feng Cotton Mills in Shanghai; Chang Chien, Jr., of Nantungchow, whose family has been interested in industrial development in China for a number of years; H. Y. Moh, managing director of the Hou Sung Cotton Mills in Shanghai and president of the Cotton Yarn Exchange in Shanghai; and P. S. Liu, managing director of the Pao Cheng Cotton Mills, Shanghai and Tientsin, and owner of the Pao Cheng Paper Mills, Shanghai.

Universal Textile Corporation is a subsidiary company of China Enterprises, Inc., which is the parent organization also of Dragon Film Corporation, and which also includes prominent Chinese and American capital and direction on its board.

The presence of present Chinese mill executives in the directorate points to the intention of the organization to secure closer cooperation between Chinese and American interests along financial and industrial lines, and for the further efficient development of cotton manufacturing in China.

Mr. Mitchell, the active operating head of the Universal, is 43 years of age. He has been connected with the Massachusetts Mills since March 1, 1907, and went with those mills at the age of 28 years as superintendent. After serving in this capacity for five years, he was promoted to the position of agent, which he held up until his resignation to become associated with the Universal Textile Corporation.

Brooks & Doxey (1920), Ltd., Manchester, England, have issued a handsome booklet on the textile machinery manufactured by them at their Union Ironworks and Junction Ironworks, Manchester. The concern was founded in 1859, and since has been engaged exclusively in the production of textile machinery. The booklet in point, says the foreword, is intended to serve more as an album than a catalog, and no attempt has been made to deal with the details of the machinery, which are published in a separate volume. The booklet contains 138 pages, with an attractive cover, and includes views of mills in different parts of the world equipped by this concern, in addition to the illustrations of the company's machinery line.

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QUALITY TEXLAND HOSIERY

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RIDER TICKETS
BOX END LABELS
BANDS

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HIGHEST QUALITY
LOWEST PRICES

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If you are already using seals, riders, etc., send samples and quantities for quotation. Prompt attention to inquiries.

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MILWAUKEE WISCONSIN

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PRODUCTS

STANDARDIZED INDUSTRIAL SEATING

Seating the worker so that each can produce more efficiently need not mean a variety of special chairs or stools. . . . . The posture requirements of the individual worker may be met by *standardizing* on one type of seating.

This type, if adjustable to height and with an adjustable back-rest, enables the seating to be shifted to different operations and be equally adapted to workers at each.

It reduces both expense and purchasing effort.

FS-14 Patented Adjustable

ROYAL METAL MFG. COMPANY
Builders of Correct Industrial Seating
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CHICAGO, ILLINOIS.

FS-15 Patented Adjustable

DIXIE MERCERIZING CO. DIXIE STRENGTH QUALITY CHATTANOOGA TENN. LUSTRE

Mercerized Yarns

C. P. Mercerized Cones & Skeins
20/2-80/2 Natural and Gassed

DIXIE MERCERIZING CO.
CHATTANOOGA, TENN.

REPRESENTATIVES: Philadelphia, Pa., Cameron & Pfingst—Reading, Pa., Cameron & Pfingst—Chicago, Ill., 817 Old Colony Life Insurance Bldg.—Toronto, Canada, Slater & Co.

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NORTH CAROLINA
PINE BOX SHOOKS

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The Bradley Stencil Machine makes Stencils in half a minute at reduced cost of 1-10c each. Write for catalogue and price list.

In universal use by thousands of manufacturers and shippers.

Oil Paper, Stencil Paper and Inks. Bradley Ball Stencil Pot uses Liquid Ink for marking and stenciling. Price 60c or $6.00 per doz. Manufacturers of Oil Stencil Papers.

Write for Prices and Samples

A. J. BRADLEY MFG. CO.
99 Beekman Street NEW YORK

The Yarn Market.

The spinner's attitude regarding prices stiffened from a variety of contributing influences and the general level of yarn rates on the Philadelphia market, which were receding as the year tapered off to a close and last month's report was written, climbed back up again during the period preceding and following the turn of the year. Indications are pointing to a continuation of strength and stability for the first part of the new year.

Price elevation from the existing low point started about December 18, and on January 17, 60½ cents was being asked for 30s two-ply skeins, which were quoted at 53 and 54 cents a month before. For 30s frame spun carded yarns on cones for hosiery use, 54½ cents was asked on the January date while in December, on the 17th, they were going for 48 cents. Single skeins and warps, two-ply warps and other types showed similarly proportionate rises.

Influenza among operatives in the smaller mill towns, a necessity for drastic curtailment brought about by a drought and low water in certain sections, and other causes were given as the bases for increases in demands on the part of the spinners. Then dealers later found it necessary to bring their views into compliance with the requests of the spinners as the days passed and higher cotton prices came into fact and prospect.

In accordance with the usual procedure in price advances, weaving yarns started first, to be followed later by those yarns used for knitting. The raison d' etra for the advances in the latter section was not quite clear in some minds, but it was pointed out that for long the prices of these yarns had needed a little touching up to put them more nearly on a parity as to value with their fellow-members of the list.

While very little is to be said as to the business done, if the space is to be gauged by the amount of yarn going over to the consumer, it was pointed out in instances that quite some good business was reported. The demand, however, had not reached that stage at which the condition of the entire market could be approximated from individual reports, and this, together with the vacation, inventory and other conditions prevailing around the turn of the year, made it necessary to consider these cases in their individual aspect. With this as the case, the increased rates were to be attributed more to the selling end than to the pressure of an influx of orders from the other end of the line. When these do come in, as many seem confident they will, they will act as a further stimulating influence, apparently.

Specific instances which might be mentioned as involving business of note were those sales of yarns for floor covering purposes, insulating purposes, etc. Although reports did not indicate these sales were overly extensive, they were evidences of progress in these lines.

In line with this thought, dealers generally are confident the yarn market will come in for its share of the goodness that is coming in 1923, entering it, as it does, in a well stabilized condition.

Following are quotations on the Philadelphia market on January 17:

Single Skeins.

4s to 8s	42	@42½	20s	48	@48½
10s	43	@44	24s	50½	@51
12s	44	@44½	26s	53½	@54½
14s	44½	@45	30s	57	@59
16s	45	@46			

Single Warps.

8s	43½	@44	20s	49	@50
10s	44	@44½	26s	54½	@55½
12s	45	@45½	30s	58	@60
14s	46½	@47	40s	66	@67
16s	47½	@48			

Carpet and Upholstery Yarn in Skeins.

8s and 9s ¾ slack	42	@43
8-3-4 tinged tubes	42	@42½
8-3-4 hard white twist	44	
8-3-4 hard twist waste	41	@42½

Two-Ply Skeins.

8s	43½	@44	20s	50	@50½
10s	44	@44½	24s	54	@55
12s	45	@45½	26s	56	@57
14s	46½	@47½	30s	59½	@60½
16s	48	@49	40s	67	@68

Two-Ply Warps.

8s	43½	@44	20s	50	@52
10s	44½		24s	54	@55
12s	45½		26s	56	@57
14s	46½	@47½	30s	60½	@62
16s	48½	@49½	40s	68	@70

Frame Spun Carded Yarn on Cones.

8s	41½	@42	22s	46½	@47
10s	43	@43½	24s	48	@48½
12s	43½	@44	26s	50	@50½
14s	44	@44½	30s	54	@54½
16s	44½	@45	40s	66	@66½
18s	45	@45½	30s double carded	54	@55
20s	46	@46½	30s tying-in	52	@53

Two-Ply Combed Peeler Skeins and Warps.

8s to 16s	60		50s	90	
20s	62	@64	60s	$1.00	
24s	65	@68	70s	$1.10	
30s	68	@70	80s	$1.25	
40s	80				

Mule Spun Carded Yarn.

10s	44	20s	49
12s	45	24s	51
14s	46	26s	53
16s	47	30s	57
18s	48	40s	71

Mule Spun Combed Peeler Yarn on Cones.

10s	53		26s	68	
12s	54		28s	72	
14s	55		30s	75	
16s	57		36s	85	
18s	58		38s	87	
20s	60		40s	90	@95
22s	63				

Among the Knitting Mills.

Shoaf-Sink Hosiery Mills, Lexington, N. C., will erect a building with 11,000 square feet of floor space, to double the capacity of the present plant. The new building will be of the most approved type of modern mill construction, brick and steel sash, with monitors down the middle permitting the highest efficiency in lighting.

Scott, Kitzmiller, Regar and Wilcox, operating a hosiery mill at Rogersville, Tenn., have purchased a tract of land 150 x 200 feet and will build an addition to double the capacity of the plant. Forty additional homes for operatives will also be constructed, and additional machinery installed at the box factory, the capacity of which will be doubled.

The mill to be built at Albany, Ala., by Cooper, Wells & Co., of St. Joseph, Mich., will be a two-story structure, 62 x 180 feet, and will contain 256 ribbing machines and 180 knitting machines.

Aycock Hosiery Mills, South Pittsburgh, Tenn., are establishing a branch at Sequatchie, Tenn.

Montezuma (Ga.) Manufacturing Company has been reorganized as the Montezuma Knitting Mills, with R. C. Collier as president. The equipment includes 30 knitting machines on ladies' and children's underwear.

Jonesboro (Ga.) Manufacturing Company has resumed operations, with C. C. Catlett, of Forsyth, Ga., as superintendent.

A three-story building will be erected by the May Hosiery Mills, Burlington, N. C., to be 80 x 100 feet.

Burnett Knitting Mills, French Broad, Tenn., recently organized with a capital stock of $50,000, has announced plans for the erection of a new building, 40 x 300 feet, to cost $25,000. It will house 500 knitting machines, giving

a production of 500 dozen pair of hosiery daily. Complete dyeing and other equipment will be installed at an approximate cost of $50,000.

An additional story to cost $22,000 is to be constructed at once on the main building of the Standard Knitting Mill, Knoxville, Tenn.

Almanace Hosiery Mills, Burlington, N. C., is erecting an addition for use as a boiler house.

The Marion-Pelican Hosiery Mills, Inc., New Orleans, La., have been organized with George H. Booth, formerly manager of the Red Star Hosiery Mills, Spartanburg, S. C., as president. The initial capitalization is $10,000. Eleven knitting machines comprised the initial installation, and this number the company expects to increase to 30 by spring. The sole product is a line of women's lisle hosiery. The officers and directors of the corporation, are George H. Booth, president; Armstrong Donaldson, vice-president; G. D. Booth, secretary; E. H. Booth, W. E. Booth, R. C. Yates and J. F. Ebert, directors.

R. F. Williams, Burlington, N. C., contemplates erecting and equipping a knitting mill.

The machinery of the Ellenboro (N. C.) Hosiery Company has been sold and the mill will go out of business.

The Sinclair Knitting Mills, Inc., New York, N. Y., recently organized with a capital of $36,000, will operate a local plant. The company is headed by S. Alpert and C. Fredericks, 342 Madison Avenue, New York.

The Rahn Knitting Co., Utica, N. Y., has been formed with a capital of $75,000, to operate a local mill, to specialize in the production of knit underwear. The company is headed by J. C. Rahn and A. J. Foley.

The Hope Knitting Co., Troy, N. Y., has arranged for an increase in capitalization from $100,000 to $250,000, for general extension in operations.

The Imperial Underwear Corporation, Wilmington, Del., has been formed under state laws with a capital of $625,000, to establish and operate a knitting mill. The company is represented by the American Guaranty & Trust Co., Wilmington.

The Cupid Knitwear Co., New York, N. Y., recently organized with a capital of $50,000, will operate a local knitting mill. The company is headed by M. and P. S. Gersheimer, and S. S. Simons. It is represented by H. Brasch, 60 Wall Street, New York.

The Nottingham Knitting Co., Oswego, N. Y., has arranged for an increase in capital to $30,000, for general expansion.

The Irwill Knit Wear Corporation, New York, has been organized under state laws with a capital of $30,000, to operate a local knitting mill. Plans are now being arranged. The company is headed by J. M. Marx and A. Heyert. It is represented by Marx & Snydecker, 5 Beekman Street.

The Keystone Knitted Fabrics, Inc., 257 Fourth Avenue, New York, has perfected plans for an increase in capital from $100,000 to $250,000, for proposed general expansion.

The Tonell-Robitschek Co., New York, N. Y., recently organized with a capital of $100,000, will operate a local mill for the manufacture of knit goods. The company is headed by A. Tonell, M. Robitschek and F. F. Bigony. It is represented by A. & H. Bloch, 99 Nassau Street, New York.

The Snyder Brothers Knitting Mills, Inc., San Francisco, Cal., recently organized under state laws, will take over the business of the same name, heretofore operated as a partnership, with mill at Eighth and Howard Streets. The new company plans for extensions. Manuel, Herman L. and S. S. Snyder are heads.

The Excello Knitting Mills, Inc., New York, recently organized with capital of $25,000, will operate a local plant for the manufacture of a line of knit goods. The company is headed by A. L. Dingle, and is represented by E. W. Drucker, 299 Broadway, New York.

The Gladstone Knitting Mills, 44 North Street, Philadelphia, Pa., are increasing the capacity of their plant and installing additional equipment. It is expected to add to the working force.

The Original Knitwear Co., New York, N. Y., has been organized with a capital of $25,000, to install and operate a local knitting mill. The company is headed by E. M. Bernstein and B. Robins. It is represented by M. Monfried, 299 Broadway, New York.

The Gloversville Knitting Co., Gloversville, N. Y., has arranged for an increase in capital from $500,000 to $700,000, for proposed general expansion.

The Gordon Knitting Co., Gordon, Pa., recently organized, has perfected plans for the operation of a local plant for the manufacture of a line of knit goods. Initial activities will be increased at an early date and the mill expanded. C. H. Heine is president.

The Hercules Knitting Co., 45 East Twentieth Street, New York, N. Y., has arranged for an increase in capital from $100,000 to $200,000, for proposed expansion.

The Piscataway Hosiery Mills, Inc., South Plainfield, N. J., recently organized to manufacture hosiery and other knit goods, has arranged for the establishment of a plant at Newark, N. J., and is equipping space in the building at 26-28 Prospect Street, for this purpose. A working force has been recruited and extensive operations are planned. It is expected to increase the production at an early date.

The Paramount Knitting Co., 337 West Madison Street, Chicago, Ill., has filed notice of dissolution under state laws. Officers of the company have formed another organization to continue the business.

The United States Knitting Co., Providence, R. I., has filed notice of increase in capital from $175,000 to $250,000, for proposed general expansion.

The Polar Yarn Co., New York, N. Y., recently organized, will operate a local plant for the manufacture of a line of knit goods. The company is headed by G. Plotkin and S. Pulver. It is represented by H. R. Lowe, 321 Broadway.

An attachment for full fashioned knitting machines, by which stockings may be clocked in embroidery during the knitting process, has been brought out by Richard Schletter, Inc., full fashioned silk hosiery, Philadelphia, and application for a patent is pending. The device, complete details of which are withheld by the inventor, is said to be inexpensive and simple in its application. It is expected that it will supersede embroidering machines for clocking hosiery, as the knitting and clocking constitute practically one operation. Besides effecting a saving in time, the use of the device enables the manufacturer to maintain in his mill direct supervision over the work of ornamenting the stocking, instead of entrusting it to establishments engaged exclusively in the business of embroidering. Necessarily the clocking can be done in any desired color, and no doubt the device will provide for a variety of design.

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Efficient Weaving

Automatic control of the amount of sizing placed on the yarns, or remaining in the size box, insures its continuous uniform application on the various warps and thus facilitates efficient weaving.

Investigate *Tycos* controls for slashers, sizers and every other process where temperature is a factor by sending for *Tycos* General Industrial Catalog. 836

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Theres a *Tycos* and *Taylor* temperature instrument for every purpose

AUTO GYP
Process of Dyeing

Most Modern Method Known

What has become of "Ye Olde Towne Crier?" Where is the old-time horse and buggy?—They are things which modern civilization has practically banished. The people—the industries have become educated to the many advantages of modern equipment for commerce and industry.

AUTOGYP is fast replacing the old and antiquated chloride of lime method of dyeing and bleaching separately.

The AUTOGYP Process of Dyeing is revolutionizing the dyeing of cotton and cotton material. The entire operation of dyeing and bleaching is performed in ONE operation of only THREE hours time. No additional equipment or unnecessary expense involved. Eliminates boiling out in kiers. Saves bleaching, shrinkage, steam, labor, time, water and all the chemicals used in the chloride of lime method of bleaching.

We are willing to prove our claims in your own mill, on your own material, under your own conditions at *our* expense.

Our booklet is brimful of interesting and informative data that every mill man should possess. Where shall we send your copy?

SURPASS CHEMICAL CO. AUTOGYP PROCESS OF DYEING AUTOGYP PATENTED IN U.S.A. SEP. 25, 1906 IN CANADA OCT. 10, 1905 ALBANY, N.Y.

Surpass Chemical Company
Albany, N. Y.

Sulphurous Acid Generator

A Paying Investment

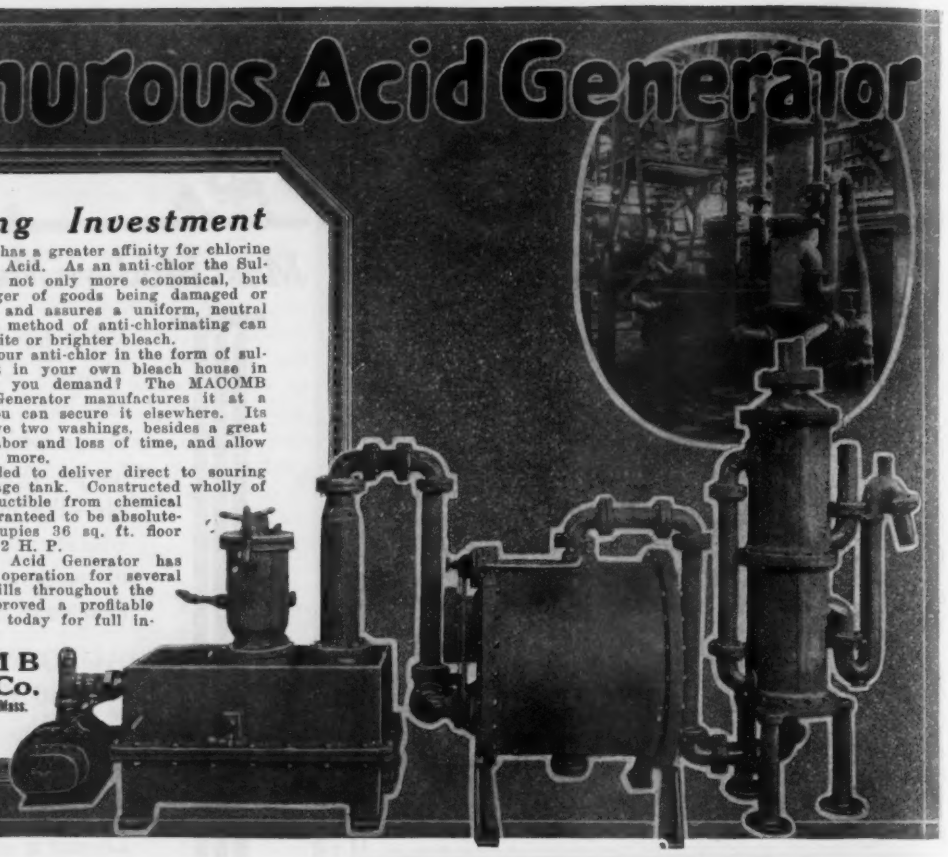
Sulphurous Acid has a greater affinity for chlorine than has Sulphuric Acid. As an anti-chlor the Sulphurous method is not only more economical, but eliminates all danger of goods being damaged or tendered on dryer and assures a uniform, neutral product. No other method of anti-chlorinating can produce as soft, white or brighter bleach.

Why not make your anti-chlor in the form of sulphurous acid right in your own bleach house in quantities only as you demand? The MACOMB Sulphurous Acid Generator manufactures it at a cost lower than you can secure it elsewhere. Its installation will save two washings, besides a great saving in power, labor and loss of time, and allow washers to produce more.

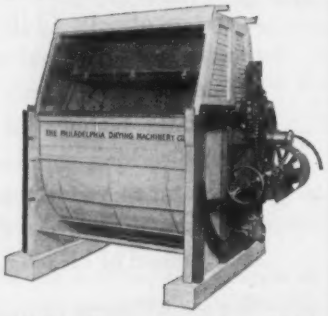
It can be installed to deliver direct to souring machine or to storage tank. Constructed wholly of lead, it is indestructible from chemical reaction and is guaranteed to be absolutely gas tight. Occupies 36 sq. ft. floor space and requires 2 H. P.

The Sulphurous Acid Generator has been in practical operation for several years in textile mills throughout the country and has proved a profitable investment. Write today for full information.

MACOMB Machine Co.
230 Newton St., Waltham, Mass.



"HURRICANE"



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If you dye or bleach hosiery it will pay you to investigate the many advantages of our latest type machine.

It is suitable for dyeing or bleaching cotton, mercerized, silk and artificial silk hosiery.

The tub is lined with monel and the pockets of the cylinder, which are also monel, are so constructed as to eliminate the use of dye nets, and will not tangle the goods.

Standard size machines—100 to 300 pounds.

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KLAUDER - WELDON
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There are K-W machines in use which were built nearly half a century ago and which are still doing their work efficiently and economically under severe service. This is sufficient evidence of the durability and capability of K-W machines after long years of subjection to the ravages of live steam, heat and alkalis.

K-W Machinery, by its accomplishments, has steadily and irresistibly built up a reputation that has made the name "Klauder-Weldon" synonymous with the "world's best dyeing, bleaching and finishing machinery."

Our interest in upholding the K-W reputation means that you MUST be satisfied, and our suggestions to prospective purchasers are made with the view toward solving any dyeing, bleaching or scouring problem for all time. We will be glad to answer any and all questions without obligation on your part whatsoever.

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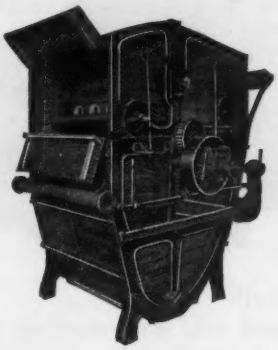

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PRESSURE GRAVITY

Especially designed to meet all requirements of Textile Mills.

Economical in upkeep.

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The Only Instrument which Combines Temperature Controller and Recorder!

To get the most satisfactory results from dyeing, sizing, finishing and all other processes in which temperature must be regulated, you need:

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The Foxboro Automatic Temperature Recorder-Controller is the only instrument which combines controller and recording thermometer. One bulb actuates both controlling and recording elements, insuring perfect coordination and, therefore, greater accuracy.

You may find it worth while to learn more about the possibilities of this improved control instrument in your plant. Write to Dept. AS for complete information.

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The Dryer of Merit

Mills all over the country are awake to the many advantages of the SARGENT Dryer—truly the dryer of merit. It is the only dryer built in which the framing is made exclusively of cast iron. This includes sills, plates, studs, and girts. There are more removable panels, thereby admitting ready access to any part of the interior of drying chambers or coil box in the SARGENT Dryers. The panels of these dryers inclose in a double thickness of steel, suitably framed, an insulation 1 inch thick.
The SARGENT is regularly equipped with self-aligning ball-bearing, air-circulating exhaust fans.

These are only a few of the numerous meritorious points of the SARGENT DRYER. Write for the full story.

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SMITH & FURBUSH MACHINE COMPANY,

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Read what one user says—

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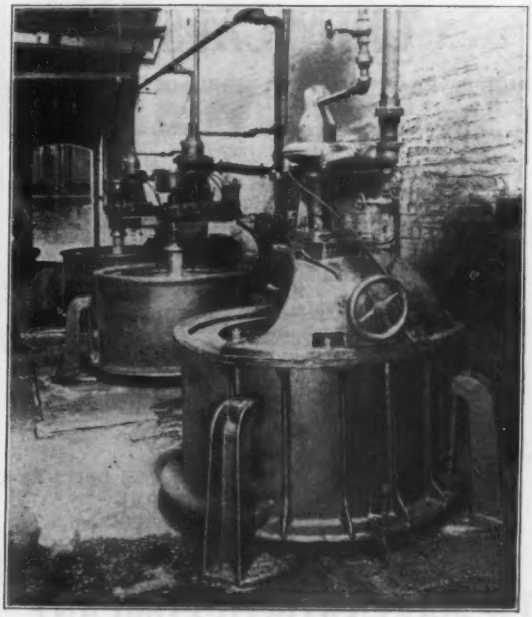

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This is a very concentrated Sulphur Blue of *bright, bloomy, reddish* shade; very soluble and good level dying.

A trial of Sulphur Blue BC2R will convince you of its excellent quality.

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We also offer a full line of Algol and Developed Colors manufactured by

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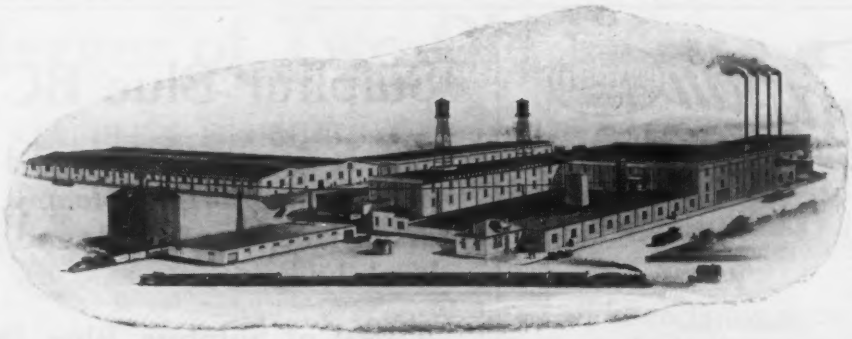

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It boils thin—it penetrates the warps—increases breaking strength and carries the weight into the cloth. Being thoroughly washed free of gluten and other foreign matter it gives a bleach and finish to the goods that you can get from no other starch.

A trial order will convince you that VICTOR STARCH has no equal on the market.

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The value of a dollar expended on mill supplies depends upon the care with which it is invested and the results obtained from what it purchases.

When you invest in the special purpose alkalies

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you obtain from their use a softer texture, brighter color, more even dyeing and greater loftiness to your textile fabrics.

These results insure such a superior appearance and feel to textile products that hundreds of textile manufacturers are benefiting by the advantage they provide in a competitive market.

So confident are we of the truth of these facts and of the ability of these products to produce these results that we guarantee them to be and do all that is claimed for them or the trial costs nothing.

Ask your supply man.

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"DEVELOPENE"

Leaves No Argument as to When

"BLACK IS BLACK"

WHY BE SATISFIED

with a RUSTY BLACK when you can have a RICH LUSTROUS BLACK by finishing your Hosiery with the latest, most efficient and satisfying patented preparation.

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Send us a pair of unfinished stockings, skein of yarn or a piece of fabric—cotton, silk, artificial silk, wool or mixes—which has been dyed black, washed, but not finished. We will finish it with "DEVELOPENE" and return to you.

There will be such an improvement that you will immediately want "DEVELOPENE" for finishing your goods.

No further softener—or soap—required. Makes hosiery slip on and off the board easily—leaves the product soft and pliable.

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Staley's Eclipse Thin Boiling Starch effectively safeguards quality of product while lowering costs. Fibres of the yarn are thoroughly cemented together, enabling better weaving. Seconds are decreased, and there is minimum shedding at the looms.

The direct economies of Staley's Starch are equally impressive. A pliable, smooth warp is produced without increased use of a softener. Absolute uniformity facilitates sizing and finishing.

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Roller Clearer and Slasher Cloths

We are in position to supply cotton mills with the highest quality Roller Cloths, Clearer Cloths, and Slasher Cloths to meet every requirement.

Our Roller Cloths give just the right cushion and uniform even surface to produce the best cotton yarn.

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The best quality of slasher cloths having sufficient cushion and porous enough to thoroughly force the sizing into the yarn.

Send us a trial order, or write us for information.

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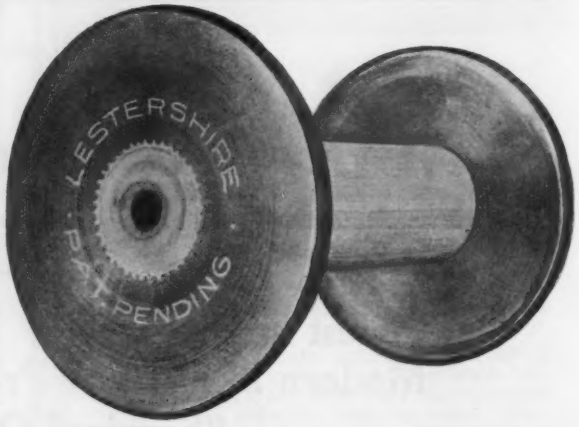
FRANKFORD, PHILADELPHIA, PA.

Southern Sales Agent: M. C. Sanders, Greenville, S. C.

What Part of the Spool is First to Wear Out?



Your superintendent will confirm our statement that 99% of all Warper, Twister or Spooler Spools become useless on account of the heads breaking, wearing rough or loosening. This is true of all types of Spools heretofore on the market.

With the Lestershire Type Vulcanized Fibre Head Spools just the opposite is true. The Heads will outwear the barrels because Hard Vulcanized Fibre (the same material from which end thrust bearings and automobile gears are made) will never break, wear rough nor splinter.

Of course the first cost is higher but, figuring your charges per thousand spools per year, they are by far the most economical spools on the market today.

In addition Lestershire Fibre Head Spools will in the ordinary mill give you an increased unloading production of nearly 50%. Put a row on your creel and compare the time necessary to unload with any other type Spool.

On the smooth Rock Maple barrel, cleanly jointed to the Fibre Heads which cannot get rough and cannot be dented, there is no place for the yarn to catch.

Spindle wear is also eliminated by bushings of hard well seasoned Dogwood.

Increased traverse can be had which will give you greater yardage on your spools. This means a saving of many dollars in the course of a year, not only direct but in labor required to change the spools.

At your request we will gladly send samples for purposes of test and comparison.

LESTERSHIRE SPOOL & MFG. CO.

Manufacturers Mill Spools, and Bobbins, of Every Description

JOHNSON CITY, N. Y.

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VERTICAL OPENERS

(Patent Applied For)

Showing the new style of Adjustable Grid Bars which improves both the quantity and quality of cleaning. A positive adjustment of the opening between these bars can be made so they can be adjusted to suit any grade of cotton used.

These bars are standard equipment on our new Vertical Openers.

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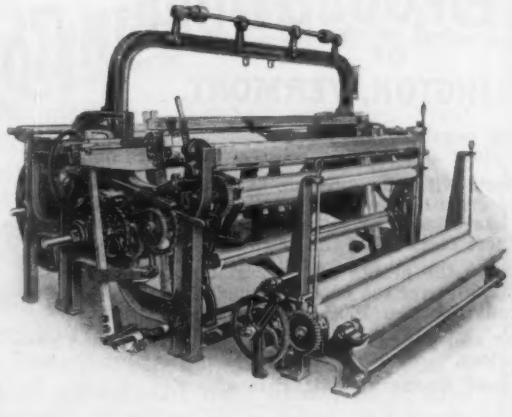
EXECUTIVE OFFICES, BOSTON, MASS.
ROGERS W. DAVIS, SOUTHERN AGENT,
CHARLOTTE, N. C.
SOUTHERN BRANCH OFFICE, GREENVILLE, S. C.

CORD FABRIC LOOM



The picture shows the Crompton & Knowles Cord Fabric Loom with Double Roll Independent Winder.

This loom weaves cloth 60" wide and with picks 2½ to 12 per inch as desired.

This is the standard weaving unit in the production of cord fabric for automobile tires. It is used almost exclusively throughout the United States in weaving the tremendous annual production of cord fabric.

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PROVIDENCE, R.I. PHILADELPHIA, PA. PATERSON, N. J.

ALEXANDER & GARSED, CHARLOTTE, N. C.
Southern Representatives.

The J. H. Williams Company Shuttle

has the endorsement of the **Textile Industry.** Our output—our large and efficient organization is evidence of this satisfaction.

Look for the **Hallmark "J. H. Williams Company"** on a shuttle. Look for it as you do **"Stetson"** in your hat. Ours is the highest standard of quality and workmanship. Every shuttle is planned with an eye to durability and strength. Each part is flawless and the coordination of parts is perfect. We market no seconds, every block unfit for shuttles is rejected. Our shuttle experts are at your service. Tell us of your shuttle troubles. Furthermore let us make up a few samples. This entails no obligation on your part.

THE J. H. WILLIAMS COMPANY

"THE SHUTTLE PEOPLE"

MILLBURY, MASS.

Geo. F. Bahan, Southern Representative

VERMONT SPOOL & BOBBIN CO.

OF

BURLINGTON, VERMONT.

There are two prime requisites in the production of superior bobbins and spools—the plant and long experience. We have both.

Our plant is equipped with the most up-to-date and efficient machinery. From the selection of the wood to the finishing of the product the same care is exercised in every department—uniform bobbins and spools of the highest class being the result.

Our long experience in the design and manufacture of spools and bobbins for textile mills all over the country enables us to understand your requirements and give you 100% satisfaction.

Give us a trial order and you will remain one of our satisfied customers. Write for prices.

"Good Goods at Fair Prices."

WASHBURN KORE-LOKT PIN BOARDS

"The Old Bobbin Boxes are going"

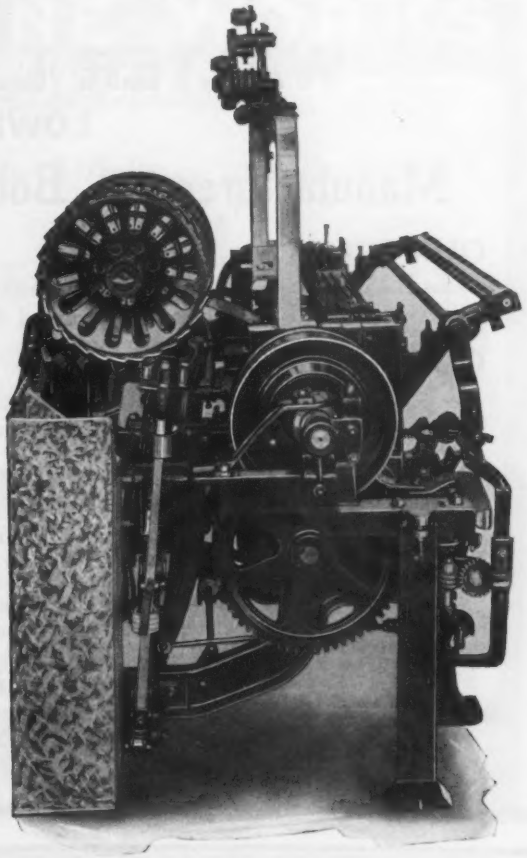
This cut shows a type of pin board construction which has successfully replaced bobbin boxes on looms.

There is a "Kore-Lokt" Pin Board to fit every textile need. Other styles are fitted with hollow or solid steel pins, with wire pins and with special wood pins, but in every type the Kore-Lokt principle is retained.

Be modern. Always consider your doffing problems in terms of pin boards. They are indispensable in measuring and controlling the operation of automatic looms. They answer every doffing requirement throughout the mill.

We invite superintendents and overseers to correspond with us concerning pin board systems. Let us send you a list of prominent mill users, each and every one of whom considers pin boards an essential factor in their success.

NEW BEDFORD MASSACHUSETTS



The Latest
NORDRAY
Automatic Loom

Multiple-harnesss, Feeler type

built by

HOPEDALE MANUFACTURING CO.

at MILFORD, MASS.

SOUTHERN OFFICE at GREENVILLE, S. C.

This loom was shown at the Late Greenville Exposition and excited great interest.

It is Still the Simplest.

WALTER L. PARKER CO.

LOWELL, MASS.

Manufacturers of Bobbins, Spools and Skewers

OUR SPOOLS:—

Are made to stand severe service and are made from thoroughly dried stock, so constructed that they are giving entire satisfaction.

OUR BOBBINS:—

Are made from the best grade of stock, and through the efficiency of our workmanship, are true running, and properly fitted on spindles.

OUR PRODUCTS:—

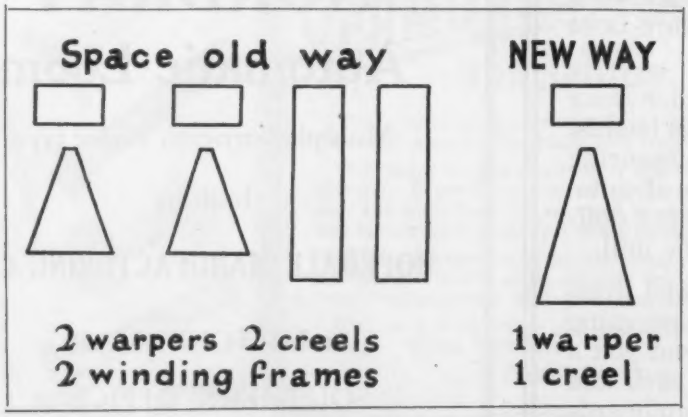
Bobbins—Warp and Filling. We put on all kinds of metal shields and caps.
Speeders—Plain; steel rings; metal base.
Spools—Warper; Twister.
Our Metal Bound Spools are pronounced the best on the market.
Skewers—Cop, Warper and Roving, of all descriptions.
Twisters—Universal Winder Rolls and Bobbins, Comber Rolls, etc.

We Specialize in New Mill Equipment

CHARLOTTE SUPPLY CO., SOUTHERN AGENTS.

NEW AUTOMATIC CREEL

for direct warping from FILLING WOUND BOBBINS



COMPLETELY ELIMINATES the

Spooling of the yarn

Spooling waste

Undue and irregular tension of yarn due to spooling

Stoppage for doffing

Doffing is done while warper is running.
Greater production from better warps at lower cost.
Better loomage from auto-creel warps because
Elasticity is preserved in yarn.

For Information address

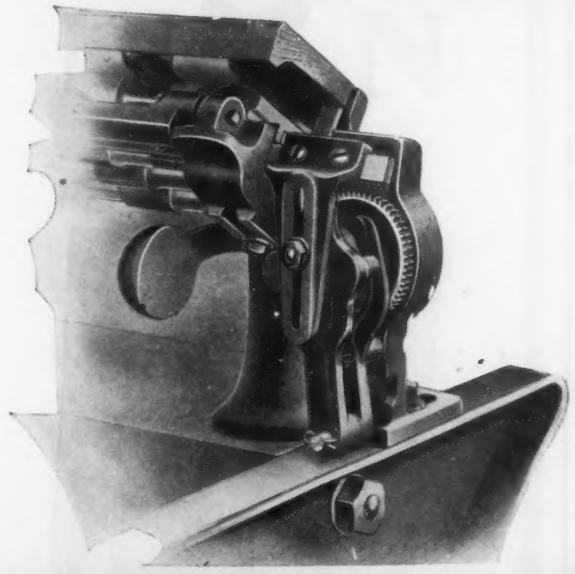
AUTO CREEL CORPORATION, NEW YORK

Room 915, Fifth Ave. Building
Alfred Suter, Sales Manager

WHITIN MACHINE WORKS

ESTABLISHED 1831

TEXTILE MACHINERY



The Efficiency and Durability

of

LEATHER TOP-ROLLS

are increased by the use of the

WHITIN

VARIABLE TRAVERSE MOTION

All Whitin Ring Spinning Frames are equipped with this device

MAIN OFFICE AND WORKS

WHITINSVILLE, MASS., U.S.A.

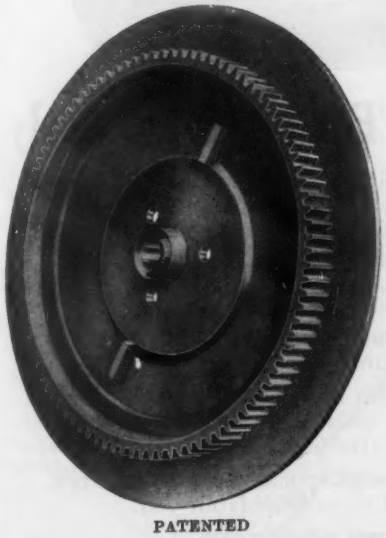
SOUTHERN OFFICE CHARLOTTE N.C.

All Steel Loom and Section Beam Heads

Mill Executives are Specifying All Steel Heads on New Equipment.

STEEL heads represent permanent equipment. The first cost is the only cost.

Once installed all expense of maintenance is eliminated.



PATENTED

GUARANTEED not to bend or spring under pressure of warp or handling of beams. Constructed to duplicate present cast-iron heads.

Ask for samples.

PATENTED

Mossberg Pressed Steel Corporation

Attleboro, Mass.

Southern Representative:
Southern Textile Specialty Co., Greenville, S. C.

New Catalogue TEXTILE BRUSHES

About the time you are reading this we will have ready for mailing our new catalog which embraces a complete range of the most successful Textile Brushes that have been developed and manufactured in our modern plant. Each brush is pictured and fully described.

This book should be in the hands of every man who is interested in Textile Brushes, and if you will simply indicate by postcard or letter that you desire a copy, it will be forthcoming as soon as the books are off the press.

ATLANTA BRUSH CO.

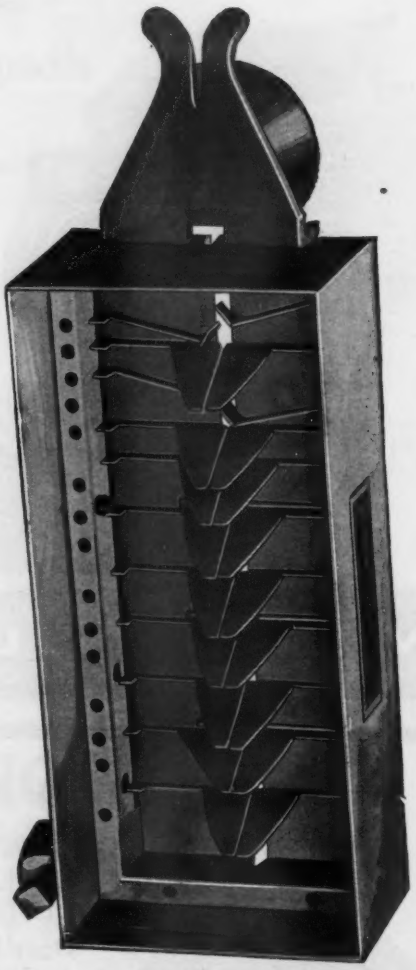
ATLANTA, GA.

ATLANTA BRUSH COMPANY

A Brush for every Textile Need

ECLIPSE

Automatic Yarn Cleaner



Threads Easily and Instantly

The ECLIPSE Yarn Cleaner embodies an entirely new principle, involving the cleaning of yarn by flexible blades which constantly vibrate.

It threads easily and instantly and automatically removes dirt, sand, slugs, bunches and all foreign matter and eliminates piecing.

The strength and elasticity of the yarn is entirely unaffected. Small, compact and easily attached.

State make of spooler or winder when writing. Let us hear from you.

ECLIPSE TEXTILE DEVICES, Inc.

ELMIRA, N. Y.

Makers of Automatic Yarn Cleaner, Automatic Stop Motion, Yarn Tension Device

ECLIPSE

MEN

Factor No. 1

MAN POWER—consisting of a loyal, contented group of experienced shuttle makers. Men who know the operation of the shuttle in the loom. Men who can meet ordinary — and extraordinary — weaving requirements.

This is the first, and greatest of the 4 factors that assure

Prompt Delivery
to the Users of Shambow Shuttles

4 FACTORS
Men
Money
Material
Machinery

HEART OF THE LOOM

Shambow Shuttle Co.

JOHN O. SHAMBOW, Pres. & Treas. — H. H. ULLMAN, V. Pres. & Gen. Mgr.

8 Winter St., Woonsocket, R. I.

Philadelphia, 421 Bulletin Bldg. — Paterson, N. J., 245 Straight St. — Greenville, S. C., Southern Factory

General Motors use *Electric Scrubbing!*

For two years, ever since its completion, the General Motors Building, in Detroit, has used Finnell Electric Scrubbing Equipment. The floors of this mammoth new office building, as a result are CLEAN.

CLEAN FLOORS—machine-cleaned—in large office buildings and factories are the accepted thing today. The Finnell System of Electric Scrubbing is no longer an experiment, but a proved necessity. Four thousand buildings and factories have demonstrated this during the past ten years.

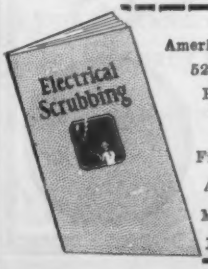
Many users of Electric Scrubbing are saving large sums of money, and all are getting CLEANLINESS that shows a return of full value for the money spent—something hand-cleaning never did. Send for booklet shown below.

American Scrubbing Equipment Sales Co.
HANNIBAL, MO.

District Offices in Principal Cities

"Clean Floors Reflect Clean Business"

FINNELL SYSTEM
OF ELECTRIC SCRUBBING



EXECUTIVE'S MEMO.

American Scrubbing Equipment Sales Co.
52 N. Collier Street, Hannibal, Mo.

Please send illustrated story of the invention and development of Electric Scrubbing.

Firm Name .....
Address .....
My Name .....
Title .....

Extend Your Market—
Get New Business—
Make New Friends—
Get New Ideas—

AT THE 19th ANNUAL

KNITTING ARTS EXPOSITION

Under auspices of National Association
of Hosiery and Underwear Manufacturers

Commercial Museum, Philadelphia, April 2 to 6

The annual "get-together" of the trades—the Exposition that creates new business—the time and the place where the Manufacturer, the Jobber, and the Retailer find every opportunity for personal contact.

Every manufacturer of Knitting Machinery, Knitted Underwear, or Outerwear, Yarns, Mill Equipment or Accessories, who seeks to widen his market, should display his line at this great business-making Exposition.

Applications for Exhibition Privileges should be made at once, as the remaining space is limited.

Under the personal direction of CHESTER I. CAMPBELL

Address all communications to Executive Offices of Exposition

5 PARK SQUARE, BOSTON, MASS.

Obtain Standardized Costs Set Piece Work Rates

Here's the Watch for Every Textile Time Study Job

Only six seconds waste on an operation in an eastern factory—but locating it with the watch saved thousands every year. A nationally known Textile concern says "We eliminated one-fourth the labor, cut costs by 23%." Cheney Bros., Champlain Silk Mills, Unity Spinning Mills and many others are doing the same thing. How? By Time Studies with Silberberg watches. Whether it's locating wastes, setting piece work rates, establishing bonus systems or many other uses—there's a Silberberg instrument specially made for the job.

The Decimal Duration Watch—Gives production figures up to three minute jobs with special arrangements for timing jobs up to 30 minutes. It also has the decimal dial and "take out time" feature

With each purchase of any type of our watches we will include at no additional charge one set consisting of our 3 Text Lesson Course on "TIME AND MOTION STUDY" including how to set Piece Work Rates and how to obtain accurate Labor Costs. All data contained therein broadens the scope and use of Time Study Watches in the Industries.

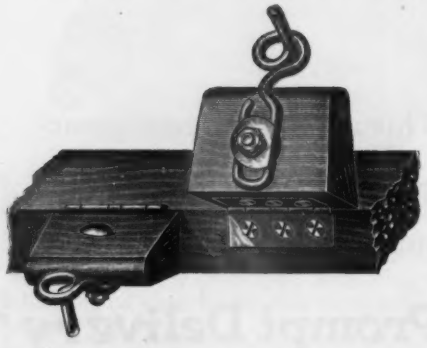
This course regularly sells for $10.00. Absolutely FREE with each Watch. Send for illustrated pamphlets and catalogues. Any of our instruments on approval to responsible concerns.

MORTIMER J. SILBERBERG CO.
Peoples Gas Bldg.
CHICAGO
Pioneers in the Manufacture and Sale of Time Study Watches.

The watch illustrated at the top with the decimal dial and "take out time" features gives direct readings in production per hour up to one minute jobs.

The Master Chronograph

The Palmer Adjustable Thread Guide



For Ring Spinning and Twisting Frames

Easily Adjusted.

Extreme accuracy and permanence of setting.

Cheapest of them all.

Mail guide-block for free sample.

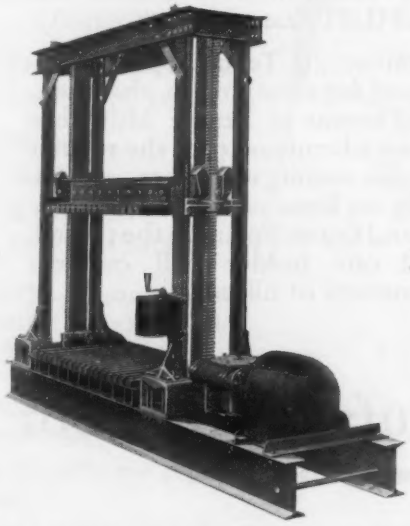
Patented and manufactured by

THE I. E. PALMER COMPANY

Middletown, - - - Connecticut

Another

REX PRESS



New Cloth Press

Speed, Strength, Simplicity

Built any size and pressure.

The Rex Creed

To build a press so good that the simple truth about it will be adequate recommendation and to price it so fairly that its value can never be questioned.

Watch for the Yarn Press.

REX ENGINEERING CORPORATION

Dunkirk, N. Y.

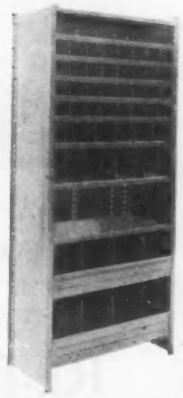
J. S. HULME

Southern Representative
Atlanta Trust Co., Bldg.
ATLANTA, GA.

LYON STEEL PRODUCTS

Steel Storage Equipment

Experienced textile men have helped us produce these Lyon products.
Due to their extreme practical economy these items are now standard equipment in modern textile mills.
They are a sensible money saving investment because of the reduction effected in supply stock investments. A properly laid out store room, plus a little system, keeps the supply stock at a minimum, yet provides means for having just what is wanted in emergencies.
Our engineers are at your service, without obligation.



Carding room suppl cabinet for draft gears spinning rolls, saddles, stirrups, etc. Create. order and cleanliness

Made entirely of steel, these tables are subject to the most rigid inspection. No rough edges project to catch threads. Splinters are entirely eliminated. Easily kept clean, fire-proof and exceptionally durable. The ideal fixture for hand-inspecting folders, etc. Price and economy, too.

For sewing machine, knitting machine and other small parts. Drawers divided and sub-divided into small compartments, each bearing a label so that any part way be instantly located. Cabinet fitted with lock.

Lyon Metallic Mfg. Company

Aurora, Illinois

New York	Indianapolis
Pittsburgh	Philadelphia
Chicago	Detroit
Rochester	Cleveland
Boston	Los Angeles

Spool, roving and bobbin trucks. One of these Lyon-made products that give absolute satisfaction

No. 20 Re-Fil-It Floor Brush

ALUMINUM HOLDER
FILLERS FOR ALL CONDITIONS

This picture illustrates our latest type of RE-FIL-IT sweeper.

Where a floor brush is required, Number 20 does excellent work and saves money, due to the RE-FIL-IT feature.

Number 20 Textile Special, designed for sweeping in the Spinning rooms of Textile Mills, has many advantages over the regular broom, among which are—practically no loose corn, sweeps cleaner and faster, no lint in the thread, and one holder will outwear many sets of fillers.

WRITE US FOR PRICES

RE-FIL-IT Broom Manufacturing Co.

185 Devonshire Street, Boston, Mass.

REEDS

For Cotton, Woolen, Worsted, Silk, Tire Fabrics, Webbing, and Wire Cloth.

We make a specialty of all Metal reeds, for Tire Fabrics, and Leno work.

HAYES LOOM REED & HARNESS CO.

182 Farm St. Woonsocket, R. I.

AMERICAN SUPPLY COMPANY

PROVIDENCE, R. I.

MANUFACTURERS OF

Loom Harness,
Weaving Reeds,
Oak Tanned Leather
Belting, Strapping,
Etc.

We make a specialty of Harness for Warp Drawing Machines

NOTE—No orders too large for our capacity. None too small to receive careful attention.

THE BELGER CO., BOSTON, MASS.

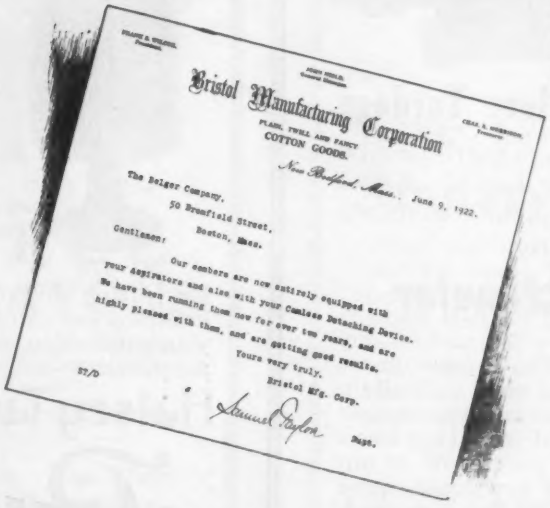
FORMERLY J. WEINBRENNER & CO.

Roth's Pat. Improved
ASPIRATORS
and Roll Waste Packers
for ALL MAKES OF
COMBERS

BETTER COMBED and
CLEANER SLIVER

SAVINGS in
WAGES,
HALF LAPS
AND BRUSHES.

WASTE of same good quality as with old doffer arrangement.


Bristol Manufacturing Corporation
PLAIN, TWILL AND FANCY
COTTON GOODS.
New Bedford, Mass., June 9, 1922.
The Belger Company,
50 Bromfield Street,
Boston, Mass.
Gentlemen:
Our combers are now entirely equipped with your aspirators and also with your Camless Detaching Device. We have been running them now for over two years, and are highly pleased with them, and are getting good results.
Yours very truly,
Bristol Mfg. Corp.
Supt.

PATENTED CAMLESS
DETACHING MOTION
for NASMITH Combers.

INCREASED
PRODUCTION

with same good quality of combed sliver for which the Nasmith comber is so well known.

LESS POWER,

SIMPLIFIED
SETTINGS and
ADJUSTMENTS.

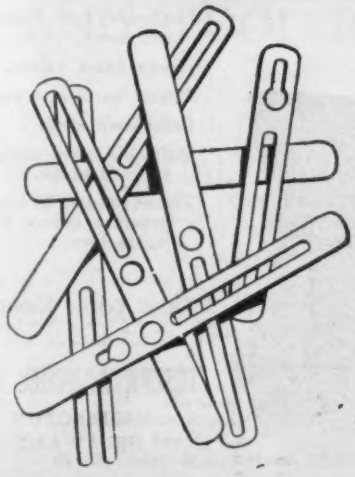
WASTE is drawn direct from brush to perforated cylinder.

WASTE delivered separately for each comber head.

NOISELESS WORKING—
This mechanism replaces the big cam, the quadrant and pinion, clutch, clutch operating cam and lever of the present machine.

ALSO IMPORTERS OF TURKEY RED YARNS FAST TO BLEACHING

GREIST



Satin Finish Loom Drop Wires
are *Good Wires*

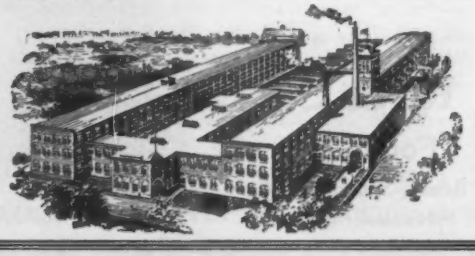
Uniformly made—free from burrs
a reliable source of supply.

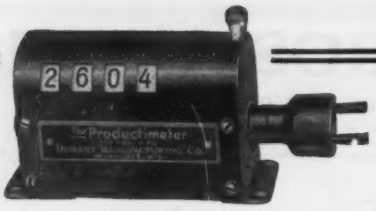
The Greist Manufacturing Company,

Dept. "C,"

New Haven, Conn.

Southern Representative
The G. G. Slaughter Machinery Co.
Greenville, S. C.





More Picks—More Yardage

And more yardage more profits. Check up on your looms. Know exactly how many picks comprise a day's work.

The Productimeter

Automatic counting is exact. Computations are not. The Productimeter gives *exact* figures—in plain sight all the time. The visibility is an asset because its spurs on the operatives. They know how far they have progressed at any hour of the day and how much speed they must put on to get the day's quota by quitting time.

Let us send you one on 30 days' trial.

1702

DURANT Manufacturing Company

633 Buffum St., Milwaukee, Wisconsin

No. 570

Do You Know Drinking Fountains Play an Important Part in Your Costs and Production?

Based on an average wage of 30c per hour, six drinks per day, two minutes per drink, your cost would be $60.00 per day for each 1000 employees.

By placing drinking fountains at convenient locations you can reduce this cost and increase your production, and when buying your equipment, select—

Halsey Taylor Puritan DRINKING FOUNTAINS

Write for complete catalog.

THE HALSEY W. TAYLOR COMPANY, Warren, Ohio

How Much "Time Out" For Drinks?

With R. & S. Fountains on the job there's no need of taking out valuable time to find a drink. A few steps to the fountain, a few seconds for a cold, refreshing drink—and back to work. But R. & S. fountains not only save these valuable minutes — they permanently remove the danger of the unhealthy pail or hydrant.

Note the sanitary features of the R. & S. Fountain. The stream is thrown up at an angle, preventing germs from falling back into the jet. LIPS CANNOT TOUCH THE NOZZLE. These fountains are always clean and inviting and are built to give years of dependable service.

Let us show you R. & S. fountains can help you meet the efficiency problem. A letter today brings our new 73-page catalog.

R. & S. Fountains

Rundle-Spence Mfg. Co.

Milwaukee, Wisconsin

VOGEL PATENTED

Frost Proof Closets

350,000 giving satisfaction. Save Water; Require no Pit; Simple in the extreme. The most durable water closet made. In service winter and summer.

- Enameled Roll flushing rim bowls.
- Heavy brass valves.
- Strong hardwood seat.
- Galvanized tank.
- Malleable seat castings will not break.
- Tested under hydraulic pressure before leaving factory.

ASK YOUR JOBBER

JOSEPH A. VOGEL CO.

WILMINGTON DELAWARE

TRADE MARK

LOWELL MILL CRAYONS

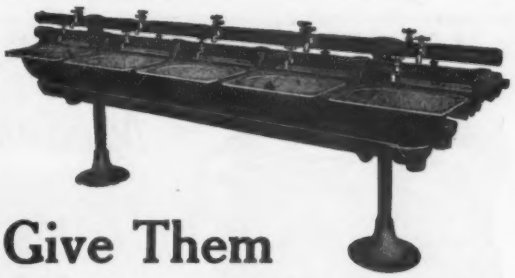
the original crayons for textile mill use, and for years the standard with America's leading mills.

Lowell Crayons are made in white and 15 colors, as follows:

1	2	3	4	5	6
Yellow	Red	Pink	Blue	Purple	Brown
7	8	9	10		11
Black	Green	Orange	Dark Green		Light Red
12	13	14	15		
Rose Pink	Light Green	Light Blue	Orange No. 2		Wh.

Order by number, please.

LOWELL CRAYON CO.
Lowell, Mass.



Give Them Sanitary Washbowls

When you consider the low cost of installing the really best kind of washing-up equipment, you will want to know more about MEECO Individual Sanitary Washbowls.
Made single and double in batteries of any number. For 15 years the Standard Mill and Factory Washbowl.

Write Today for Catalogue and Prices.

Lockers
Chairs
Drinking Fountains

METAL MEECO PRODUCTS

Shelving
Partitions
Boxes and Cabinets

Manufacturing Equipment and Engineering Co.
BOSTON, MASS.

An Ever *Increasing Demand* For "AMTEX" SPINNING, TWISTING AND SPOOLER TAPES

From

Southern Spinners

THE QUALITY AND PRICE RECOMMEND THEM

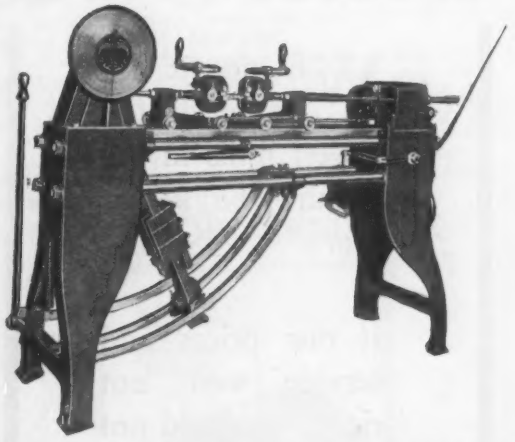
Manufactured by

AMERICAN TEXTILE BANDING CO., Inc.

GERMANTOWN, PHILADELPHIA, PENNA.

Sold in the South by
Charlotte Supply Co., Charlotte, N. C.
James Supply Co., Chattanooga, Tenn.
Montgomery & Crawford, Spartanburg, S. C.

SCOTT TESTERS



THE SCOTT HORIZONTAL 800 LBS. CAPACITY—INCLINABLE BALANCE FABRIC TESTER

An American Invention, Built in America by Skilled American Mechanics and adopted as the Standard for testing all heavy fabrics for American requirements.

We also build the Standard Testing Machines for Light Fabrics, Yarns, etc.

HENRY L. SCOTT & CO.
BLACKSTONE & CULVER STS., PROVIDENCE, R. I.

Typewriter Friction Means Office Friction

Pounding on an inferior, noisy typewriter "gets on the nerves" of an operator.

One nervous, irritable, dissatisfied girl may disorganize the whole office force.

Executives can get better results by furnishing their typists with a ball bearing, silent running L. C. Smith.

There are many things about this machine that we would like to tell you if we may have the opportunity.

Our illustrated catalog is free.

L. C. Smith & Bros. Typewriter Co.

Home Office and Factory: SYRACUSE, N. Y.

Branches in all Principal Cities

IF YOU HAVE ANY SYMPATHY

for dirt, grime, oily floors, inefficient cleaners or dingy surroundings, DON'T USE

SAVOGRAN

or you will be disappointed. Very simple to find out more about it.

"ASK YOUR SUPPLY HOUSE"

Made for forty-eight years by

INDIA ALKALI WORKS

BOSTON, MASS.

PRINTING

WE do it for some of the largest mills in the South—*Why not for yours?*

If our prices and service were not right, we could not do it.

THE A. J. SHOWALTER COMPANY

Dalton, Georgia.

Send for FREE story

Interesting, illustrated folder "How to get Greater Desk Efficiency" shows how to keep your desk cleared for action. Thousands of Kleradesks are giving entire satisfaction. Saves time locating, distributing or sorting papers. Takes less space than a tray. Sent FREE trial.

Kleradesk

Mailing Lists

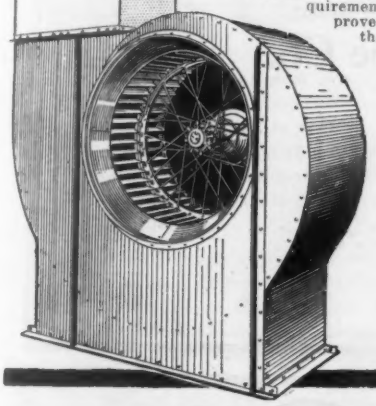
Will help you increase sales

Send for FREE catalog showing details covering names of your best prospective customers. Counts and prices are given on thousands of different Mailing Lists.

99% Guaranteed by refund of 5¢ each

ROSS-Gould Co 318 10th Street St. Louis

EFFICIENT VENTILATION



Can be obtained only through the use of equipment designed to meet the specific requirements for which it is intended.

Bayley

Plexiform Fans

are made in a variety of capacities, from 300 to 300,000 cubic feet per minute. They are designed especially with a view of handling a maximum volume of air from a minimum of space and power requirement. Their efficiency as proved by installations in thousands of the largest industrial, public, school, theatre and office buildings, makes them prime favorites with architects, engineers and owners.

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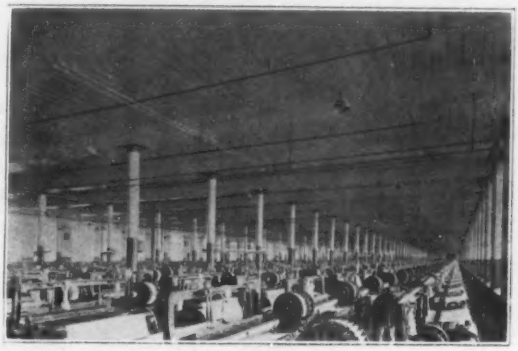
Bayley Mfg. Company
Dept (I)
Milwaukee, Wis.

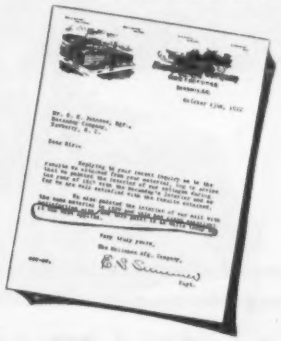
HOCKADAY

THE WASHABLE FINISH FOR ALL INTERIORS



Weave Room—The Mollohon Manufacturing Co., Newberry S. C.

The Yard Stick of Durability



HIGH humidity, dampness, changes of temperature—all these conditions are encountered in weave and slasher rooms. How long will tne ordinary paint stand up—and stay white—against such odds? Not long.

Look at the picture again. The walls are white! The Mollohon Manufacturing Company uses nothing but the best. In five years they used 7,050 gallons of Hockaday. It saves them money.

Hockaday is the only mill white that does not require a size or special undercoater for slasher and weave rooms. That's only one of its nine exclusive features.

A NEW BOOK—SEND FOR IT

"Solving your Painting Problems" is a challenge. It's brim-full of striking facts. Well illustrated. You'll like it. We will send the book to you gladly, no obligation, of course. Write us today.

THE HOCKADAY COMPANY
1823-1829 Carroll Avenue
CHICAGO

O. H. JOHNSON, MGR. SOUTHERN BRANCH, OFFICE, NEWBERRY, S. C.

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Zemco-lite

TRADE MARK

"The Cement Paint" *Help You Utilize Every Ray of Daylight*

Daylight costs you nothing. Why not use it?

A coat of "ZEMCO-LITE" on your walls and ceilings renders a well lighted interior, free from glare. It makes daylight work for you.

"ZEMCO-LITE" is made with pure WHITE Portland Cement as its aggregate and positively will not discolor or crack off. It is an ideal paint for mill interiors.

We also manufacture a complete line of mill village paints. Various attractive colors for you to select from.

Let our service laboratories assist you in securing the most economical and durable paints made. Write us.

American Cement Paint Co.
Chattanooga, Tennessee

CEMENT FOR PERMANENCE—WHY NOT "ZEMCO-LITE?"

No material yet devised for distributing electric current in textile mills and industrial establishments equals

REALFLEX

in the matter of efficiency and economy. This steel-armored cable is exceedingly flexible, durable and convenient, as well as thoroughly safe. It can be had in many different sizes for carrying different loads, and meets the requirements of electrical codes so thoroughly that its use is practically an insurance against trouble from inspection or from other sources.

Ask your jobber for REALFLEX if you want to use the most efficient and economical steel armored electrical cable.

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Youngstown. Ohio

District Sales Offices:

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Wood Preservatives, Stains, All colors Metallic and Composition Paints

SAVE THE SURFACE WITH W WARE WEATHER PAINTS TRADE MARK REG.

Barn Paints, Roof Coating Roofing and Roofing Materials

Atlanta, Ga.

Defeats the Costly Ravages of Weather and Wear

Makes all surfaces—wood, metal or composition — moisture proof; rust proof; rot proof.

Adds years of serviceable life to every part of the mill. Best of insurance against replacement or repair costs.

Used and recommended by Industrial Plants and Cotton Mills, everywhere.

Distributors of FLINTKOTE Roofing.

Our Application Department will be glad to give you estimates on applying new roofs. Our service Department at your call—any time—anywhere.

CONCRETE — DIXIE PORTLAND CEMENT CO. ROYAL CHATTANOOGA, TENN. — PERMANENT

MR. TAXPAYER—YOU!

Do you want your country to spend YOUR good money on roads that will wear out before your bonded indebtedness is liquidated?

I SAY YOU DON'T.

What you want is a hard-surfaced road, with little cost for maintenance—a road that can be traveled in rain or snow, summer and winter. You want a PERMANENT road—that means CONCRETE!

Write for Literature—It's Free

DIXIE PORTLAND CEMENT CO.

CHATTANOOGA, TENN.

What the Wool Sorter Saw

Which Has a Good Tip for You

A professional wool sorter probably has the most acute vision of any skilled specialist. His eye is trained to judge the size of wool fibres within a few thousandths of an inch. Millions of dollars worth of wool are bought and sold on this ocular measurement.

We recently invited one of these experts to bring a few samples and examine them under Cooper Hewitt light. Drawing out the fibres of one of his samples and looking at them under the lamp in our office, he at once remarked, with some surprise: "Why! this light *magnifies* the fibres. They look much coarser than they really are."

That Cooper Hewitt light has a virtual magnifying power we have long known, but had never before met such a direct, *practical* demonstration of the fact.

The next day a scientific journal came to our desk, in which was a technical article by one of the highest authorities on optics in the world. Among the facts therein set forth was this: *"Increase in visual acuity produces visual magnification."* That is, anything that increases the *sharpness* of small objects *increases their apparent size.*

Here was the scientific explanation of the wool sorter's observation. The increase in visual acuity produced by Cooper Hewitt light is well known.

A light that *increases the working power of the eye* ought to be valuable in the textile mill,—shouldn't you think?

Our Industrial Lighting Briefs give the whole story in few words.

Cooper Hewitt Electric Company

BETTER THAN DAYLIGHT

Hoboken New Jersey

C-H-153

Don't Waste Light!

NO textile mill executive would deliberately waste paint, or chemicals, or oil. Yet many do waste light—and believe that their lighting is efficient. It is always best to know the facts.

Above is reproduced an untouched photograph of a cloth room in a southern cotton mill equipped with IVANHOE RIM reflectors and bowl-enameled MADZA lamps. This reflector is equally applicable for use in the spinning room, the weave room—everywhere, in fact, throughout the plant. It enables you to secure good lighting which increases production, decreases spoilage, betters employee morale, and makes possible proper plant sanitation. A recent development of the RLM reflector is the IVANHOE Glassteel Diffuser which reduces glare to an absolute minimum.

Near you is an IVANHOE distributor who will be glad to advise you regarding your lighting, without charge or obligation on your part. See him at once, or write to us direct.

IVANHOE-REGENT WORKS *of General Electric Company*
Cleveland : : : : : : : : : : Ohio

"SERVICE TO LAMPS"

IVANHOE

GLASS SHADES—STEEL REFLECTORS

Installation Costs!

An electrical system in a Textile Mill represents a big investment of valuable equipment, the selection and design of which should not be left to guesswork and the installation of which should not be entrusted to any ordinary electrical contractor.

The cost of Huntington & Guerry Service, compared with the investment involved and the future economy and dependability of the system, is almost negligible.

Huntington & Guerry Service means that you can turn over your electrical problems to us with the firm knowledge that the equipment selected and the design and workmanship of the system will insure not only initial economy on the investment, but economy, safety and satisfaction permanently.

HUNTINGTON & GUERRY, INCORPORATED
GREENVILLE, S. C.

HUNTINGTON & GUERRY TROUBLE PROOF ELECTRICAL INSTALLATIONS

H & G TROUBLE-PROOF ELECTRICAL INSTALLATIONS

General Electric

Distributing Jobbers

Complete lines of Wire, Switches, Safety Switches, Wiring Devices, Fuses, Edison Mazda Lamps and other electrical materials carried in our Atlanta and Savannah warehouses ready for immediate shipment.

Quick Service

Carter Electric Co.

(WHOLESALE)

21 Haynes St. Atlanta, Ga.

GET IN LINE—

Where the breaking strength of the yarn is a matter of importance Mill men are equipping their Slasher Cylinders with Ball Bearings.

Let us quote you on our Ball Bearing Truck Rollers. We have the easiest and most satisfactory method of applying ball bearings to Slashers.

A set will convince you.

AldricH MachinE

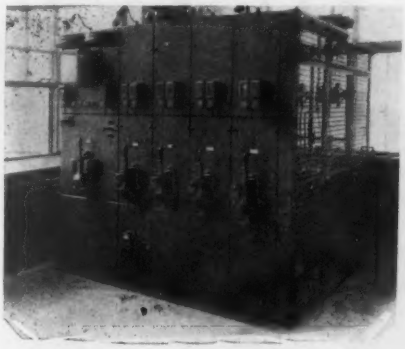
Ball WorkS Bearings

Greenwood, S. C.

The Essentials of Efficient Electrical Installations

Among the numerous essentials necessary to successful and economical electrical installations, the most important are: scientific design to meet the mill's individual requirements, proper selecting of materials, skillful and expert wiring, proper insulations and correct placing of equipment installed.

Years of practical experience, coupled with careful research work, place the highly skilled individuals and technical experts of the Walker organization in a position to render textile mills a service that will assure them of a more efficient, safe and economical electrical system.



Switchboard in an industrial plant purchasing central station power.

No matter how large or how small the job, it requires the careful supervision of experts —a corps of men who know electricity from a to z. Men of this calibre only compose the Walker organization and assure you of the very best service and knowledge that can be procured.

Ask for the handsome Walker Book.

Switchboard installation in power plant at Riverside Mills, Danville, Va.

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ATLANTA, GEORGIA.

Branch Offices at Convenient Points Throughout the South

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An installation of 240 spinning frame motors in the Monarch Mills, Union, S. C.

Send for Bulletin

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THE JOHNSON FRICTION CLUTCH

As Used on the

WERNER DYE JIGGERS

Equip Your Dye Jiggers the "JOHNSON WAY"

Double Clutch Exterior

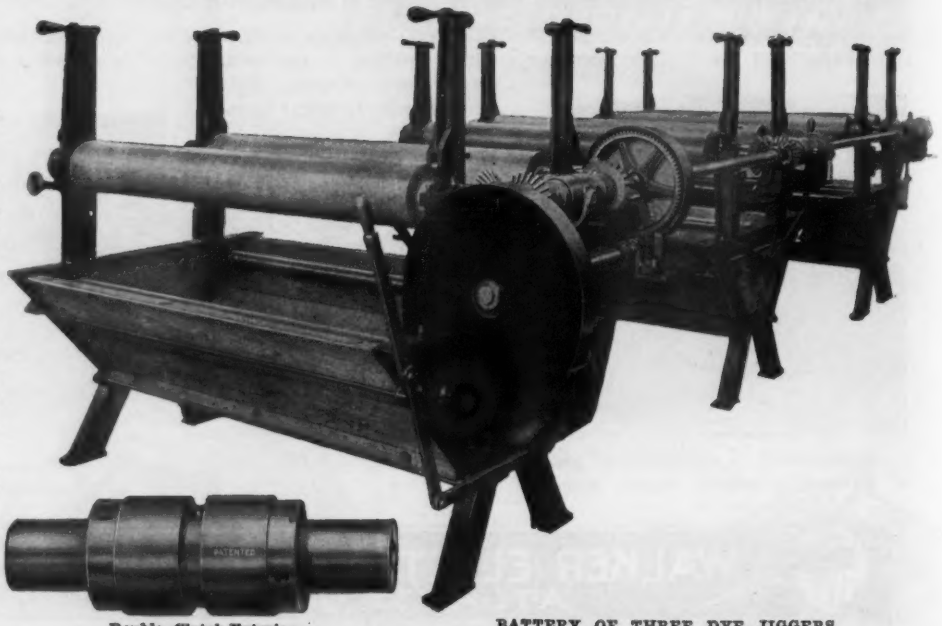
A No. 4 Double Clutch is used on the end of each machine to operate the rolls either way through bevel gears mounted on hubs.

For textile machinery it is very essential that a reliable and powerful clutch be used so that the machine will always be working at its maximum capacity and thereby be efficient in output.

The Johnson Clutch has been tried by the leading textile machine manufacturers and adopted on its merit for many machines. The most of these machines are of special design for a particular purpose and therefore cannot be given publicity.

Let us work out your problems.

Write for Catalog "G."



Double Clutch-Exterior

BATTERY OF THREE DYE JIGGERS WITH JOHNSON CLUTCHES
Courtesy of: Werner & Co., Inc., Passaic, N. J.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

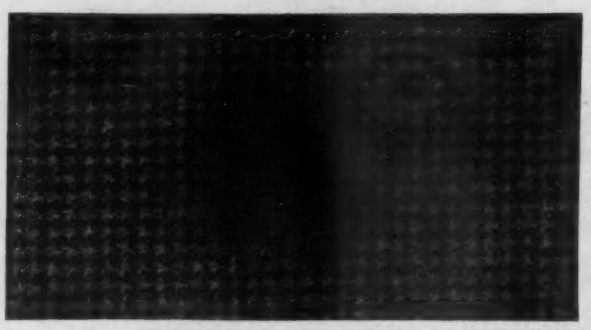
Stained Goods!

Hot Bearings mean short life.

Bearings are expensive.

Oil running out of bearings means dirty floors and machinery. RESULTS! WASTED MATERIAL FROM STAINED GOODS.

STAYSWELL laughs at drips and spatters.



STAINED GOODS ARE EASY TO AVOID BY USING THE SNOW-WHITE STAINLESS GRADES OF STAYSWELL

STAYSWELL "STAYS PUT" on the hottest bearing, eliminating all friction.

Let us quote you on your requirements.

LAMSON OIL CO., Inc.
10 Dorrance St. Wharf
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BALL BEARINGS Chapman

YOU PAY FOR THEM WHETHER YOU BUY THEM OR NOT

Who Pays?

Who pays for the power that friction steals—right in your own plant?

You do! But that is because you have not become familiar with the famous CHAPMAN BALL BEARINGS.

Day after day, year in and year out, you keep on paying for power that you do not get—power that FRICTION consumes.

CHAPMAN-IZE NOW AND SAVE MONEY

Here is an investment that will save you money as long as you are a producer through the use of power—an investment that pays for itself in a couple of years. "CHAPMAN BALL BEARINGS ON ALL YOUR LINE-SHAFTING ELIMINATES FRICTION."

Fool-proof, trouble-proof, care-free are these enemies of friction—and they'll save you as much as 15% to 40% in power costs.

The saving is too great to ignore! You pay for CHAPMAN'S whether you buy them or not! Why not have them?
THEY FIT YOUR PRESENT HANGER FRAMES

Drop us a line, and we'll be glad to tell you more.

TRANSMISSION BALL BEARING COMPANY

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Branches: New York, Chicago, Philadelphia, Cambridge, Mass.; Toronto, Canada. Representatives in Principal Cities.

A few of thousands of plants NOW USING CHAPMANS As Standard Equipment

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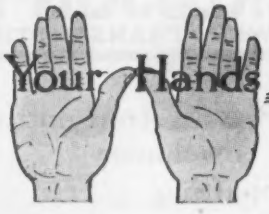
A Hammer

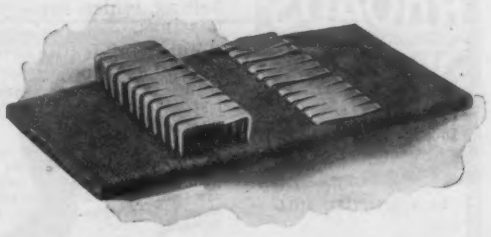
A Piece of Soft Wood

Your Hands



These are the only things necessary to fasten a belt with

Bristol's Patent Steel Belt Lacing



And, the job of lacing the belt is just as simple; any machine operator can do it for himself—in fact, will take pride in doing it. Better give him a chance and eliminate "Long Stops" and idle machinery.

A few boxes of Bristol's about the shop in handy places does not mean a big investment, but they make a good belt joint in a short time.

Bulletin 711-J tells about them.

THE BRISTOL COMPANY : WATERBURY, CONN.

Boston New York Philadelphia Pittsburgh Detroit
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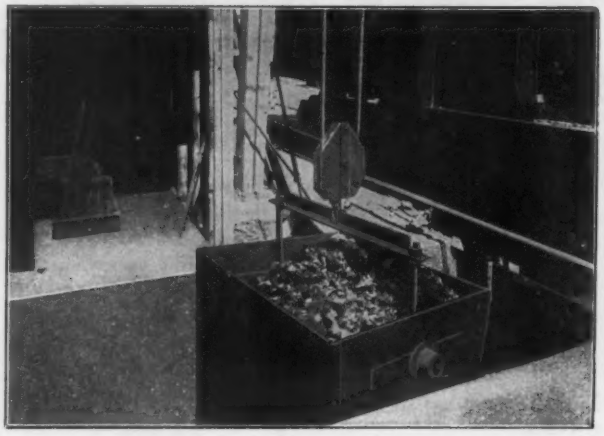
One Ton or a Shovelful?



ONE man can raise a ton with the *Godfrey Conveyor* and not exert a fraction of the energy required to lift a shovelful of coal.

One man can unload and store a carload of coal in an hour and a half with a *Godfrey Conveyor* at an average power and labor cost of from five to seven cents a ton.

The *Godfrey System* eliminates demurrage and enables you to secure larger allotments of coal during periods of industrial stress. It frees you from labor difficulties and makes you economically independent.

When you realize that you can install a *Godfrey Conveyor* at no greater cost than the price of a good truck, you will want to know more about this equipment.

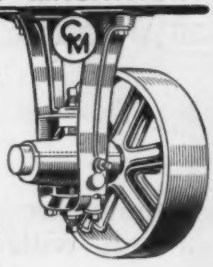
Ask for Catalogue Z.

Godfrey Conveyor Company

Elkhart, Indiana, U. S. A.

CRESSON-MORRIS

POWER TRANSMITTING MACHINERY



Power transmitting machinery
Shafting
Rope transmission
Machine moulded and cut iron and steel gears for heavy service.
Complete plant equipment.
Engineers; founders; machinists.
Sugar centrifugals.

CRESSON-MORRIS CO.

PHILADELPHIA, PENNSYLVANIA

Branch Office:
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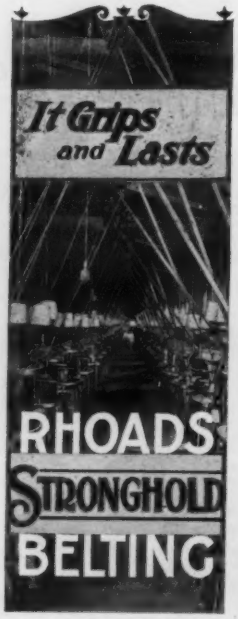
Sixty Years Experience as Engineers-Founders-Machinists



IN A KNITTING MILL

RHOADS

Stronghold Belt

MORE efficient than the best grade of oak belting—that is what our testing department has proved Stronghold Belting to be.

It is made from Rhoads Tannate side leather; has the Tannate toughness and elasticity, the Tannate strength and grip.

It gives you more power and less slippage, which means greater output. It carries the load with less tension than oak belting, which saves your bearings.

For many textile drives, six inches and under in width, we recommend RHOADS STRONGHOLD LIGHT DOUBLES.

They are often more satisfactory than heavy singles and will carry the load of regular oak doubles. A trial should show their economy on your drives.

J. E. RHOADS AND SONS

PHILADELPHIA: 30 N. THIRD ST.
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CYCLONE HOISTS
HIGH SPEED

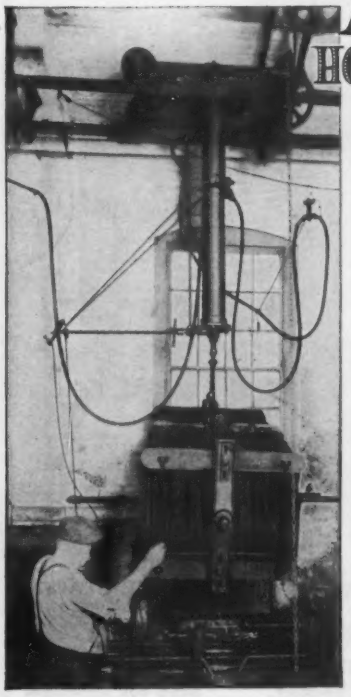
More Lift Per Pound Pull!

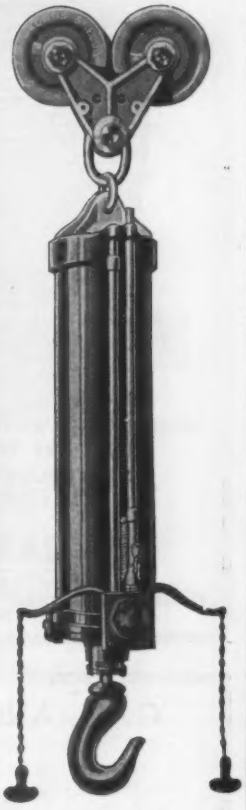
The Gyrating Yoke, a patented mechanical improvement found exclusively in Cyclone Hoists, keeps two-thirds of its teeth in constant contact with the teeth of the large load chain gear. That means a surer, more powerful drive with remarkably low frictional losses and practically no vibration. Roller bearings (another C. M. hoist improvement) insures smooth action, a faster, easier lift, and *longer life.*

Catalog completely descriptive of our hoists, cranes and trolleys will be mailed on your request

The Chisholm-Moore Mfg. Co.
Cleveland, Ohio
Hoists Cranes Trolleys
Branches: New York Chicago Pittsburgh

CURTIS
AIR HOISTS





"Lift it with air

Used in The Textile Industry

Curtis one man All Steel Air Hoists and Curtis Roller Bearing Trolleys are effecting important economies in leading textile mills throughout the country.

Why not install a Curtis Air Hoist and operate it with the air you now have available? The wide variety of uses to which Curtis equipment can be most economically applied is worthy of your immediate investigation.

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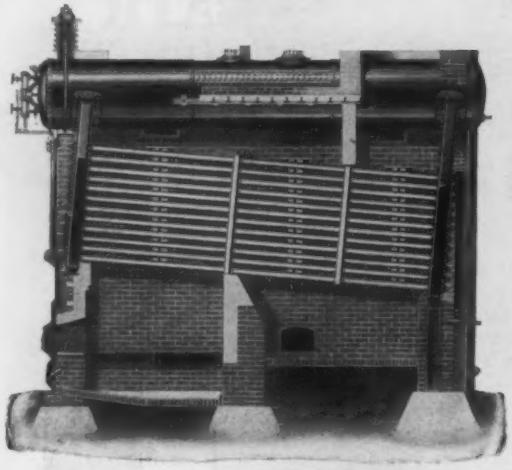
AIR COMPRESSORS-HOISTS-TROLLEYS-CRANES
ST. LOUIS
C.P.M.Co.

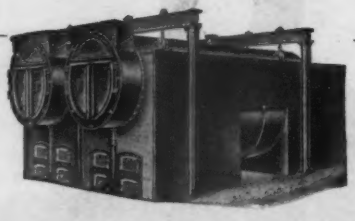
Established 1854

WATER TUBE BOILERS



HORIZONTAL WATER TUBE BOILERS
VERTICAL WATER TUBE BOILERS
TUBULAR AND MARINE BOILERS
STEEL CASINGS, SMOKE STACKS

THE CASEY-HEDGES CO.
CHATTANOOGA, TENN.
Quick Shipment Our Specialty. Send for Catalogs.



The Result of a Quarter Century Experience

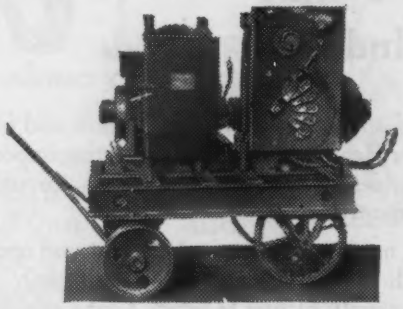
These years of experience and study together with exhaustive tests and improvements, has enabled us to build modern boilers that are second to none—in design, construction, high efficiency and capacity, economical operation, and low cost for upkeep.

Made in several types. Write us today and let us send you full data and reasons why the W & W BOILER will best meet your requirements.

The Walsh & Weidner Boiler Co.
CHATTANOOGA, TENN.

WALSH & WEIDNER
TUBULAR WATER TUBE **BOILERS**

G. E. ARC WELDING SET



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Service, Quality, Satisfaction

We strive at all times to render to our customers and the textile industry prompt service, highest quality and complete satisfaction in the purchase of a G. E. ARC WELDING MACHINE.
The G .E. ARC WELDING MACHINE should be in the machine shop of every cotton mill in the South, saving great sums of money thru repairing and renewing broken or worn parts, machinery, etc. The savings that can be effected thru the use of This efficient electric welding machine soon pays its cost.
Remember—The G. E. ARC WELDING SET renders perfect results with great economy.
We also carry a full stock of oxy-acetylene supplies—welding torches—latest improved.

Write us for complete information.

George Bird Bruce Potts

WELDING ENGINEERS

BIRD-POTTS CO.

WELDING Incorporated BUILDING
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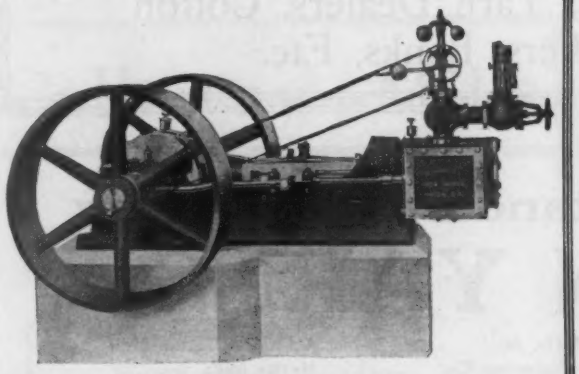
Traverses the most rapidly developing sections of Georgia and Alabama, where excellent opportunities are offered for commercial development, and where supplies of coal, coke, timber and other raw materials are available in abundance.

IF YOU WANT A FACTORY SITE WE CAN HELP YOU FIND WHAT YOU WANT.

For further information communicate with

H. S. YOUNG, Industrial Agent
ATLANTA, GA.



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Macon, Georgia

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High Pressure Return Tubular Boilers, High Grade Stationary Steam Engines, Tanks, Stacks, Stand Pipes.

Heavy Castings and Wrought Iron Works.

Standard Oxygen

Cuts Repair Costs

Oxy-acetylene welding is saving textile mills thousands of dollars monthly. But still more economies can be effected if you use only the PUREST gas you can obtain.

STANDARD Oxygen is 99.5% pure—the best that can be bought.

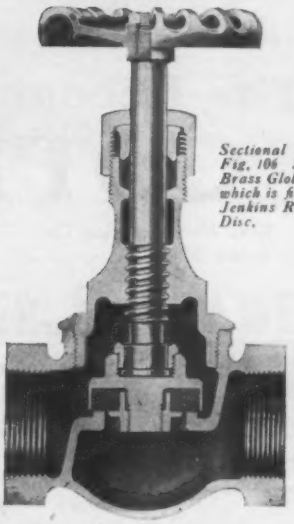
We can not only supply oxygen and supplies and Welding Equipment, but we can send experts to your mill to instruct your mechanic how to use them.

Write us for more detailed information.

Standard Gas Products Co., Inc.

ATLANTA

REG. U.S. PAT. OFF. TRADE JENKINS MARK Jenkins Bros



Sectional view of Fig. 106 Standard Brass Globe Valve, which is fitted with Jenkins Renewable Disc.

Proper proportion—strength throughout

Note the thorough distribution of metal in a Jenkins Valve. There is ample strength throughout to meet the strains of expansion and contraction.

The Jenkins Disc always forms a perfect contact with the seat. The spindle is powerful and accurately threaded. In the bonnet, there is ample packing space and plenty of packing, compressed by brass gland or follower. The non-heat hand wheel is made of malleable iron, lacquered green. The ends are accurately threaded.

In every respect, every Jenkins Valve, of any type, is designed, made, tested, and guaranteed for the severest service in the use for which it is recommended.

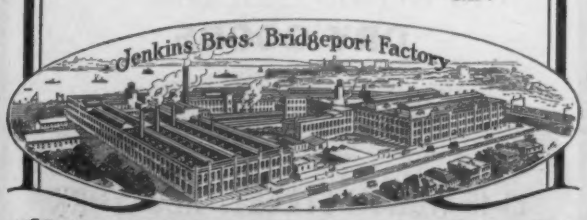
At Supply houses Everywhere

JENKINS BROS.

New York Boston Philadelphia Chicago
Montreal London

FACTORIES: Bridgeport, Conn.; Elizabeth, N. J.; Montreal, Canada.

2621-J



Jenkins Valves

SINCE 1864

Commission Merchants, Yarn Dealers, Cotton Dealers and Brokers, Banks, Etc.

The Recognized Standards of Quality
COTTON YARNS

Gray Manufacturing Co.
Arrow Mills, Inc.
Parkdale Mills, Inc.
Flint Manufacturing Co.
Arkray Mills, Inc.
Arlington Cotton Mills
Myrtle Mills, Inc.

Our Fine Yarns Make Fine Fabrics

The manufacturers of a number of America's well known textile products can vouch for the strength, uniformity, cleanliness and better weaving and knitting qualities of our yarns.

The yarns we spin for knitting, weaving, laces and converting, are furnished in all twists on skeins, cones, tubes and warps:

30s to 80s Single and Ply Combed Peeler Right Twist. 30's to 50's Single and Ply Double Carded Peeler, Right or Reverse Twist.

20s to 60s, 2, 3, and 4 Ply, Combed Peeler, Reverse Twist.

Our products are sold direct and exclusively through our General Sales Offices:
225 Fifth Avenue at 26th Street,
New York.
H. A. FLORSHEIM, Sales Manager
Long Distance Phone:
Madison Sq. 7666-7-8 and 9.

BRANCH OFFICES { Boston, Philadelphia, Chicago

GRAY DAWN QUALITY YARNS Gray Manufacturing Co. Gastonia, N.C.

ARROW MILLS COMBED YARNS GASTONIA, N.C.

MYRTLE MILLS INC. COTTON YARNS GASTONIA, N.C.

PARKDALE MILLS, Inc. PARKDALE YARNS ARE THE BEST GASTONIA, N.C.

ARLINGTON COTTON MILLS COTTON YARNS GASTONIA, N.C.

FLINT MFG. CO. TRADE FLINT MARK GASTONIA, N.C.

Weimar Bros.

Phone Connections
Works, 2046-48 Amber Street,
PHILADELPHIA, PA.

MANUFACTURERS OF
Cotton Mercerized Tapes, Spool Tapes, Bindings and Narrow Fabrics for Underwear and other Trades.

WOODWARD, BALDWIN & CO.

DRY GOODS

Commission Merchants

43-45 WORTH STREET, NEW YORK

CARVER-BEAVER YARN CO.

Successors to A. D. SALKELD & BRO., Inc.
ALL NUMBERS COTTON MERINO **YARNS** ALL COLORS WOOL WORSTED
366 BROADWAY, NEW YORK

STENCILS

FOR COTTON SHIPPERS, COTTON MILLS MERCHANTS & MANUFACTURERS - ALSO BRUSHES, INK, MARKING POTS
RUBBER STAMPS, NOTARIAL, CORPORATION SEALS
ATLANTA RUBBER STAMP & STENCIL WORKS
OFFICE 33 LUCKIE ST. WORKS: 350 EDGEWOOD AVE.
P.O. BOX 884 (LARGEST STENCIL AND STAMP HOUSE IN GEORGIA) ATLANTA, GA.

Callaway Mills

INCORPORATED

345 Madison Avenue

Phone—Murray Hill 7801

NEW YORK

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Milstead Manufacturing Co.
Elm City Cotton Mills
Manchester Cotton Mills
Hillside Cotton Mills
Unity Spinning Mills
Villa Rica Cotton Mills
Athens Manufacturing Co.

Boston Representative
M. R. ABBOTT
110 Summer Street

Chicago Representative
RAY T. JOHNSON
226 W. Adams Street

ESTABLISHED 1872

H. & B. BEER

NEW ORLEANS

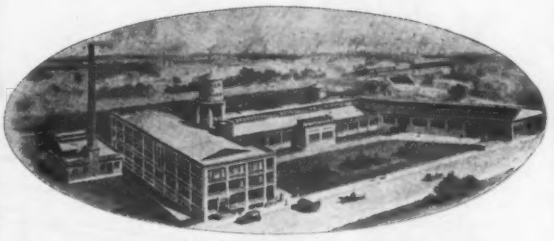
HENRY BEER
J. WILLIAM BARKDULL
EDGAR H. BRIGHT
C. MORGAN ABRAMS

MEMBERS OF

New Orleans Cotton Exchange
New Orleans Future Brokers Association
New York Stock Exchange
New York Cotton Exchange
New York Coffee Exchange
New York Produce Exchange
Chicago Board of Trade

Associate Members of the Liverpool Cotton Association

Private Wires to Principal Points



View of Our Mercerizing and Bleaching Plant

BOGER & CRAWFORD

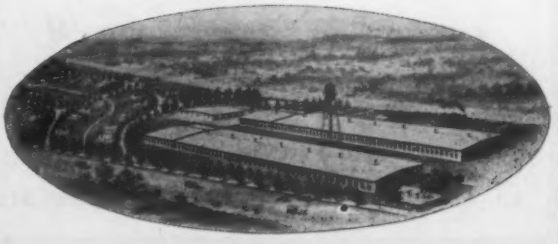
MAIN PLANT Philadelphia, Pa.
SPINNING MILL Lincolnton, N. C.

As we stand on the threshold of our Fifteenth Year, we take this opportunity to express our sincere appreciation of the support and co-operation by the trade.

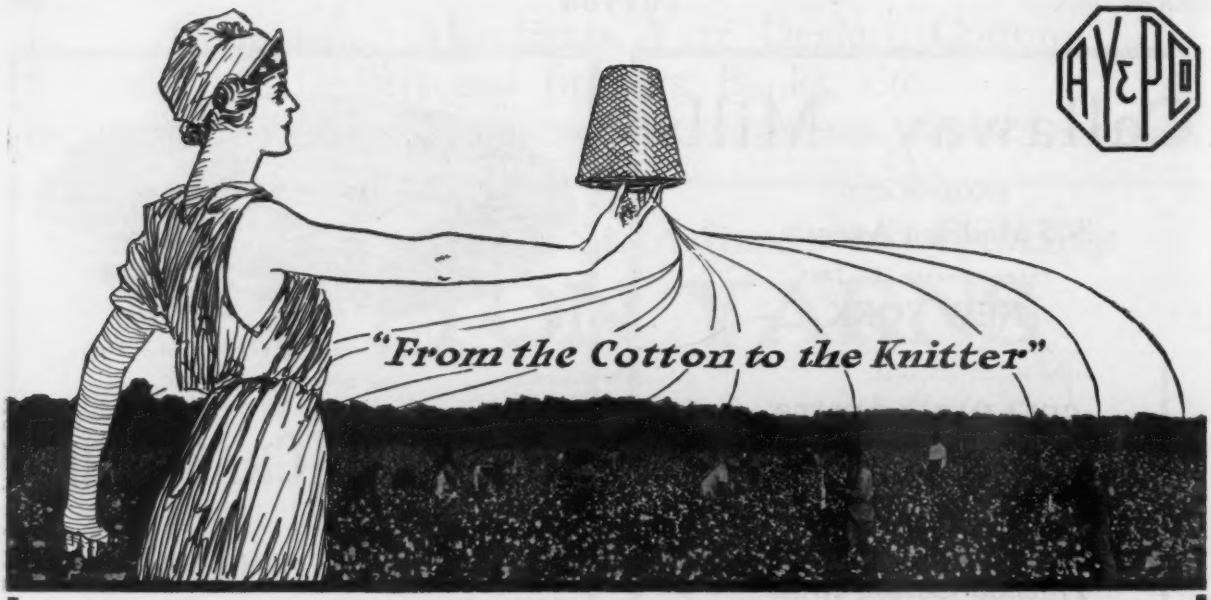
Through this means we have been able to grow and expand, thus affording our customers and friends the benefits of our greatly increased facilities.

Because of this fact and the loyal support of our staff of experienced workers, we are able to offer our friends far better service than ever before.

ROBERT C. BOGER
ALFRED CRAWFORD



Spinning Mills, Lincolnton, N. C.



AMERICAN YARN & PROCESSING CO.
MOUNT HOLLY, N. C.
SPINNERS AND MERCERIZERS
HIGH GRADE COMBED AND CARDED YARNS—16s to 80s
Our Mercerized Yarns Are the Product of Our Own Mills
General Office, Mt. Holly, N. C. Branch Office, 1111 James Bldg., Chattanooga, Tenn.
Representatives
H. B. ROBIE, 346 Broadway, New York City FORREST BROS., Forrest Bldg., Philadelphia

J. H. LANE & CO.

Tire Fabrics
Enamelling Duck
Sheeting
Cord Fabric
Wide Drill
Osnaburg

Special Constructions
Cotton Fabrics

250 W. 57th St.
NEW YORK

226 West Adams St.
CHICAGO

—SILK—
Oscar Heineman Co.
CHICAGO

SINGLE MERCERIZED
—YARNS—
Southern Mercerizing Co.

SOUTHERN YARN CO.
911 JAMES BUILDING, CHATTANOOGA, TENN.
—SINGLES AND PLY YARNS
OF EVERY DESCRIPTION
DIRECT FROM SPINNERS—

HUGHES FAWCETT
IMPORTER AND COMMISSION MERCHANT
LINEN YARNS
For Weaving, Knitting and all Purposes.
TURKEY RED YARNS
For Towel Borders, Towellings and Bleaching Cloth
Linen Jacquard Harness Twine
And Every Description of Linen Thread and Twine
115 Franklin Street, : NEW YORK

EUROPEAN PLAN

Rooms 600 Baths

Headquarters in Detroit for

OLD COLONY CLUB

DETROIT AUTOMOBILE CLUB

. . DAILY RATES . .

100 at $2.50 Single—$4.50 Double

150 " $3.00 " —$5.00 "

100 " $4.00 " —$6.00 "

50 " $5.00 " —$7.00 "

50 with Twin Beds, $5.00 to $7.00

100 In Suite, $5.00 to $8.00, Double

Two Floors of Agents' Sample Rooms $5.00 per Day

Table d'Hote Dinner, $1.25-$2.00

HOTEL TULLER

Under New Management

CAFETERIA O. C. FROMAN, Mgr. GRILLE

Business Men's Lunch 65c.

A Matter of Economy

The MARTINIQUE

IS GLAD TO ANNOUNCE REDUCED RATES

SOMEONE must take the initiative in making it possible for people to travel and spend less money—now that there is less money to spend.

So, hand in hand with Hotel McAlpin which recently announced its reductions, the Martinique —just across the street and under the same management—becomes a leader in lowering hotel tariff.

This is setting an advance style, as it were, for there has not been an appreciable reduction in the cost of running a large New York hotel.

If, however, the public esteems the spirit in which it is done, as much as the management of the McAlpin and Martinique appreciates its patronage, then indeed, is it worth doing.

At the Martinique the new prices are: $3.50 up for rooms and bath; $2.50 for room without bath.

The MARTINIQUE

Broadway, at 32nd St., New York

Frank E. Jago, Resident Manager

ATLANTA'S NEW MILLION DOLLAR HOTEL

POPULAR PRICED

HOTEL CECIL

COFFEE SHOP—ROOF GARDEN

312 ROOMS—FIRE PROOF—312 BATHS

RATES PER DAY, EUROPEAN PLAN

	ONE PERSON	TWO PERSONS
22 ROOMS AND BATH	$1.50	
104 ROOMS AND BATH	2.00	$3.00
104 ROOMS AND BATH	2.50	4.00
53 ROOMS AND BATH	3.00	5.00
14 ROOMS AND BATH	4.00	6.00
8 ROOMS AND BATH TWIN BEDS		5.00
7 ROOMS AND BATH TWIN BEDS		7.00

H. R. and C. R. CANNON, Proprietors

J. F. deJARNETTE, Manager

OPERATING

GEORGIAN HOTEL ATHENS, GA. TERMINAL HOTEL ATLANTA, GA.

ALL ABOARD

Winter Excursion Fares And All Year Tourist Fares

—TO—

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Arizona	Havana	Oregon
Arkansas	Kentucky	South Carolina
British Columbia	Louisiana	Tennessee
California	Mississippi	Texas
Florida	New Mexico	Virginia
Washington		West Virginia

—VIA—

Georgia Railroad

Atlanta & West Point R. R.

Western Railway of Alabama

Liberal time limit and stop-over privileges.

For further information apply to

J. P. BILLUPS, G. P. A.

714 HEALEY BUILDING, ATLANTA, GA.

CLASSIFIED ADVERTISING

RATES:

DISPLAYED.

"For Sale" and all other advertisements using bold-face type or otherwise displayed, $2.00 per inch per insertion.

Rates for larger spaces furnished on application.

WITHOUT DISPLAY.

"Positions Wanted" 3 cents per word per insertion. Minimum charge 50 cents. Payable in advance.

"Positions Open" and other undisplayed advertisements, 4 cents per word per insertion. Minimum charge $1.00. Payable in advance.

(When replies are to be received in our care, allow four words for box address.)

New and Second Hand

ENGINES

Corliss Automatic and Slide Valve

BOILERS

Pumps, Hoisting Engines, Gas and Gasoline Engines.

MACHINE TOOLS

Lathes, Planers, Shapers, Drill Presses, etc.

WOOD WORKING

Planers, Molders, Band Saws, etc.

ELEC. MACHINERY

Dynamos and Motors

AND SUPPLIES OF ALL KINDS

FRANK TOOMEY, Inc.,

127-31 N. Third St.

Philadelphia, - Pennsylvania

FOR SALE

The following machinery, all in good condition, will be for sale by February 1st. Can be inspected while running up to that time.

16—(12 Gang) No. 50 Universal Doublers—Total Spindles 204—Equipped for 3 ply.

2—(New) No. 160 Doublers—50 Spindles each—Equipped for 5 ply.

6—Universal Winding Super Cone Machines Model 80—Total Spindles 72.

1—Foster Cone Winder Model 30—100 Spindles.

14—Fine Twisters, 264 Spindles each—2" ring, 3" gauge, band driven—8 of these can be used for wet twist.

18—Draper Twisters, 100 Spindles each—4½" ring, 5½" gauge, band driven. 8000 New Spools for same.

12—Jack Speeders, 224 Spindles each. Self Balanced Rail 6 x 2½; 4¼" Space.

For appointment to see this Machinery Write

Utica Spinning Company, Inc.
Utica, New York

For Sale

BED SPREAD PLANT.

A complete plant in full operation, consisting of 24 C. & K. 96-inch 4 x 4 box Looms with sewing, fringing, beaming, cop and bobbin winding machinery, in full operation. Owner retiring. Address

BOX 74, Care COTTON,
Atlanta, Ga.

FOR SALE

Completely equipped cotton mill, manufacturing twines, mop yarns and rope. Send for list of equipment.

ROMAC MILLS,
MEMPHIS, TENN.

Salesman Wanted

An old established firm manufacturing a full line of Sizings, Softeners, Soap dyeing and Finishing materials, have a good opening in the South for a man who can produce.

This is an exceptional opportunity, only those having previous experience in selling this line, combined with a knowledge of mill practice need apply.

Reply in strict confidence. Address Box 75, care COTTON, Atlanta, Ga.

Wanted

Superintendent of Weaving, including Warping, Slashing, and Winding, for a novelty mill making fancy Dobby and Box patterns from fine combed yarns and Artificial Silk. In applying state fully past experience, (giving make and description of looms) and state whether you have ever done any actual "fixing." State present salary and if possible send sample of cloth you are familiar with. Do not bluff. Southern location; ideal climate; good salary to start with, and good opportunity for advancement to anyone who knows his business and is willing to work hard. Address, A.X.M., care of "COTTON," Grant Building, Atlanta, Ga.

WANTED POSITION AS ELECTRICIAN—Experienced in management of dynamos and motors; present employed. Address Box 72, care COTTON, Atlanta, Ga.

WANTED—Position as Master Mechanic. I have had experience as master mechanic and chief engineer in some of the more prominent cotton mills of the South, extending over a period of a number of years. Can furnish best of references as to ability, character, etc. Shall be glad to hear from any mills interester. Address Box D, care COTTON.

Do You Want to Sell It?

Probably you, like many other mills, have some equipment which you have taken out, or are thinking of taking out and replacing with new equipment.

Why not dispose of this second-hand equipment at a profit? COTTON is read by thousands of Cotton Mills that are hardly touched by Northern journals.

You Can Sell Your Second-Hand Equipment

to these mills through advertising in the Classified Advertising Section of COTTON. Such advertising produces results at small cost—why not try it out and get that second-hand equipment off your hands in a profitable way? Tell us what you have for sale and let us insert an advertisement for you.

COTTON

GRANT BUILDING ATLANTA, GA.

MACHINERY BARGAINS

for Textile Mills

The Nashville Industrial Corporation, purchasers of the $87,000,000 Old Hickory Powder Plant, has released a large amount of machinery for immediate sale, a large portion of which is very desirable for use in textile plants. None of this equipment was in use over 90 days, and while in practically new condition it is offered at second-hand prices.

Special Bulletins covering various kinds of equipment will be sent on request.

A few of the many offerings:

PUMPS.

8—14-in. Worthington Class B, double suction, 8500 G.P.M. at 152 ft. head, at 1170 R.P.M., direct connected to 300 hp. G.E., 3 phase, 60 cycle, 2200 volt motors.

4—14-in. Allis-Chalmers, Type S, 7500 G.P.M. at 130 ft. heat at 1760 R.P.M., direct connected to 300 h.p. General Electric, 3 phase, 60 cycle, 2200 volt motors.

2—10-in. Allis-Chalmers, Type S, 3750 G.P.M. at 130-ft. head at 1765 R.P.M., direct connected to 150 h.p. Westinghouse 3 phase, 60 cycle, 2200 volt motors.

6—16-in. Allis-Chalmers, Type S, 8500 G.P.M. at 90-ft. head, direct connected to Type L, 300 h.p., 2000 R.P.M. G.E. Curtis steam turbine.

6—14-in. Allis-Chalmers, Type S, 6500 G.P.M. at 150-ft. head, 8100 G.P.M. at 90-ft. head, direct connected to 300 h.p. 2000 R.P.M. G.E. Curtis steam turbine.

1—20 x 12 x 16 Worthington duplex Underwriters fire pump, 1500 G.P.M., 100 lb. pressure.

200—New and used simplex and duplex, steam driven, Worthington pumps, 4½x3¾x4, 5½x4¾x5, 6x4x6, 7½x4½x10, 6x2½x6.

100—New and used belted 2½", 3", 5", 5", and 6" centrifugal pumps.

Bulletin No. 8 gives complete specifications of all Pumps.

BLOWERS.

2—18-in. Type C. American Electric Exhaust Fans.
10—18-in Buffalo Electric Disc Exhaust Fans.
6—24-in. Buffalo Electric Disc Exhaust Fans, Emerson Motors.
28—24-in. Buffalo Electric Disc Exhaust Fans, E. S. C. Motors.
64—30-in. Buffalo Electric Disc Exhaust Fans, Emerson Motors.
18—30-in. Buffalo Electric Exhaust Fans, Sprague Motors.
5—No. 1 Buffalo Baby Conoidal Fans, Emerson Motors
4—No. 2 Buffalo Baby Conoidal Fans, Emerson Motors.
4—No. 3 Buffalo Baby Conoidal Fans, Emerson Motors.
15—No. 4 Buffalo Baby Conoidal Fans, Emerson Motors.
All the above equipped with standard A.C. Motors.

BLOWERS—continued.

5—No. 3 Buffalo Niagara Conoidal Fans.
10—No. 4½ Buffalo Niagara Conoidal Fans.
25—No. 6 Buffalo Niagara Conoidal Fans.
15—No. 7 Buffalo Niagara Conoidal Fans.
1—No. 9 Buffalo Niagara Conoidal Fan.
10—No. 4 Buffalo "B" Volume Blowers.
5—No. 5 Buffalo "B" Volume Blowers.
2—No. 6 Buffalo "B" Volume Blowers.
5—No. 8 Buffalo "B" Volume Blowers.
10—No. 1 Low Pressure Gas Exhausters.
10—30-in. Buffalo Standard Reversible Mill Exhausters.
25—50-in. Buffalo Standard Reversible Mill Exhausters.
10—No. 4 24-in. Buffalo Steel Pressure Blowers.
7—Roots Style D, High Pressure Type Blowers, capacity 890 cu. ft. per minute.
2—Connersville Blowers, capacity 3,200 cu. ft. per minute.
Write for Bulletin No. 11 giving complete specifications.

TRANSMISSION.

Thousands of pulleys, including pressed steel, split cast iron and solid cast iron, ranging in diameter from 6 to 56 inches, and in width from 2 to 32 inches, are included with the material at Old Hickory.

Also hundreds of tons of cold rolled shafting up to six inches in diameter, pillow blocks, drop hangers, ring-oiling, capillary and standard bearings, flange couplings, ribbed couplings, grim death couplings, wall brackets, floor stands, pillow block frames, friction clutches, cut-off couplings, sleeves, collars, etc.

We can supply complete line shafts or any transmission equipment needed. Write for Bulletin No. 15.

TANKS.

1500—New and used steel Tanks, small sizes. Mixing tanks, storage tanks, boiling tanks, pressure tanks, and open tanks.
2000—Wood tanks. All sizes.
Hydro-Extractors, Cotton Washers and Dryers, Mixing Pickers, Rinsers, etc.
Electrical Supplies of all kinds.

Write for Catalogues.

NASHVILLE INDUSTRIAL CORPORATION

JACKSONVILLE, TENN.

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Commercial Acetylene Supply Co.
Oxyeld Acetylene Co.
Standard Gas Products Co.

ACETYLENE WELDING APPARATUS.
(See Welding Apparatus.)

ACIDS.
(See Dyestuff and Chemicals.)

ACCOUNTANTS.
Ernst & Ernst.
La Frentz & Co., F. W.

ACCOUNTING SYSTEMS.
Ernst & Ernst.

ADDING MACHINES.
Monroe Calc. Mch. Co.

AERATING AND CLEANING MACHINE.
Murray Company, The.

AIR WASHERS.
American Blower Co.
Bayley Mfg. Co.
Buckeye Blower Co.
Carrier Eng. Corp.
Parks-Cramer Co.
Sturtevant Co., B. F.

AIR COMPRESSORS.
(See Compressors.)

AIR CONDITIONING SYSTEMS
(See Humidifying Apparatus.)

ALBONE.
Roessler & Hasslacher Chemical Co.

ALKALIES.
(See Dyestuffs and Chemicals.)

ALUM.
(See Finishing and Sizing Materials.)

ANILINE COLORS.
(See Dyestuffs and Chemicals.)

ANTI-CHLORINE.
(See Dyestuffs and Chemicals.)

ANTI-CHLORINE ACID GENERATOR.
Macomb Machine Co.

APRONS—RUB.
Bond Co., Chas.
Smith & Furbush Machine Co.

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Robert & Co.
Sirrine, J. E.
Stuhrman, Edw. A.

ARTWORK.
Jacobs & Co.

ASH HANDLING MACHINERY.
(See Coal Handling Machinery.)

ASPHALT SLATE SHINGLES.
(See Slate Asphalt Roofing.)

ASPIRATORS.
Beiger Co.

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(See Trucks—Auto.)

AUTOMATIC CONTROLLERS (TEMPERATURE).
(See Temperature Regulators.)

AUTOMATIC LOOM ATTACHMENTS.
(See Loom Attachments.)

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Brooks & Doxey, Ltd.
Lord Bros.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Sargent's Sons Corp., C. G.
Whitin Mch. Works.

AUTOMATIC SCALES.
(See Scales.)

AUTOMOBILES.
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BACKWASHERS.
Sargent's Sons Corp., C. G.

BAROMETERS.
Taylor Instrument Co.

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Hyatt Roller Bearing Co.
Skayef Ball Bearing Co.
Transmission Ball Bearing Co.
U. S. Ball Bearing Co.

BALL BEARING HOUSINGS.
Aldrich Machine Works.
Fafnir Bearing Co.
Transmission Ball Bearing Co.
U. S. Ball Bearing Co.

BALE BAND BUCKLES.
(See Box Strapping & Buckles.)

BALE OPENERS.
(See Openers.)

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Crompton & Knowles Loom Wks.
Draper Corporation.
Economy Baler Co.
Logemann Bros.
Lord Bros.
Rex Eng'g Corp.
Saco-Lowell Shops.

BALING PRESSES.
(See Presses.)

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Weimar Bros.

BANDAGE & TAPE MACHINES.
Foster Machine Co.
Whitin Mch. Wks.

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BANDS (HOSIERY LABELS AND STICKERS).
Kirby-Cogeshall Co.

BANKS.
National Shawmut Bank.

BARRELS—FIBRE.
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BASKETS—MILL.
(See Boxes—Mill.)

BATH CABINET—SHOWER.
Crane Co.
Lyon Metallic Mfg. Co.
Sanymetal Products Co.

BATTERIES (ELEC.)
(See Storage Batteries.)

BEAMS.
Allen Co.
Mossberg Pressed Steel Corp.
U. S. Bobbin & Shuttle Co.

BEAM DYEING MACHINES.
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Cocker Mch. & Fdry. Co.

BEAM HEADS.
Allen Co.
Jordan Mfg. Co.
Mossberg Pressed Steel Corp.
U. S. Bobbin & Shuttle Co.

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(See Warpers and Warping Machinery.)

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Dodge Sales & Eng. Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Renold, Inc., Hans.
Skayef Ball Bearing Co.
Transmission Ball Bearing Co.
U. S. Ball Bearing Co.
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Bond Co., Chas.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

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Morse Chain Co.
Renold, Inc., Hans.

BELTING (ROUND—LEATHER).
Bond Co., Chas.
Rhoads & Sons, J. E.

BELTING—ROPE.
(See Rope Transmission.)

BELT CONVEYORS.
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Link-Belt Company.
Morse Chain Co.

BELT DRESSING.
Bond Co., Chas.
Dixon Crucible Co., Jos.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

BELT FASTENERS AND LACING.
Bond Co., Chas.
Bristol Co.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

BELT TIGHTENERS.
Link-Belt Company.
Rhoads & Sons, J. E.
Wood's Sons Co., T. B.

BENCH DRAWERS.
Lupton's Sons Co., David.

BENCH LEGS (PRESSED STEEL).
Lupton's Sons Co., David.

BENCHES (PARK AND PLAYGROUND).
(See Playground Equipment.)

BLEACHERIES.
(See Dyers, Bleachers and Finishers.)

BLEACHING KIERS.
Butterworth & Sons Co., H. W.
Cocker Mch. & Fdry. Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Textile Finishing Machry. Co.
Woolford Wood Tank Co., G.

BLEACHING MACHINERY.
(See Dyeing, Bleaching and Finishing Machinery.)

BLEACHING, FINISHING AND SIZING MATERIALS.
(See Finishing Materials.)

BLOWERS AND BLOWER SYSTEMS.
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Bayley Mfg. Co.
Buckeye Blower Co.
Carrier Eng. Corp.
General Electric Co.
Philadelphia Drying Mchry. Co.
Sturtevant Co., B. F.
Westinghouse Elec. & Mfg. Co.

BOARDS—FIBRE.
National Vulcanized Fibre Co.
Standard Fibre Co.

BOARDS—FORM.
Pearson, Jos. T.

BOBBINS.
Draper Corporation.
Jordan Mfg. Co.
Lestershire Spool & Bobbin Co.
Parker Co., Walter L.
Shambow Shuttle Co.
Vermont Spool & Bobbin Co.
U. S. Bobbin & Shuttle Co.
Whitin Machine Works.

BOBBIN HEADS.
Allen Co.
Jordan Mfg. Co.
U. S. Bobbin & Shuttle Co.
Vermont Spool & Bobbin Co.

BOBBIN STRIPPERS.
Crompton & Knowles Loom Works.

BOILERS.
Casey-Hedges Co.
Cole Mfg. Co., R. D.
International Engineering Wks., Inc.
Lombard Iron Works & Supply Co.
Nashville Industrial Corp.
Schofield's Sons Co., J. S.
Toomey, Frank.
Walsh & Weidner Boiler Co.

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Norwood Engineering Co.
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Crane Co.
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Godfrey Conveyor Co.
International Engineering Co.
Jenkins Bros.
Lunkenheimer Co.
Nashville Industrial Corp.
Sturtevant Co., B. F.

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(See Grates and Stokers.)

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Monroe Calc. Mch. Co.

BOX STRAPPING AND TIE BUCKLES.
(See Banding Straps and Buckles.)

BOXES—MILL.
Hightower Box & Tank Co.
Lewis Co., G. B.
Lyon Metallic Mfg. Co.
National Vulcanized Fibre Co.
Standard Fibre Co.
Walke Box Co.

BOXES—PACKING.
(See Packing Boxes.)

BRAID.
(See Tapes.)

BRAZING.
(See Welding.)

BRICK (PAVING AND FLOOR)
National Paving Brick Co.

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(See Cotton Dealers & Brokers.)

BROKERS—STOCK.
(See Stocks and Bonds.)

BROOMS.
(See Brushes.)

BROOMS—REFILLABLE.
Re-Fil-It Broom Mfg. Co.

BRUSHES—MILL.
Atlanta Brush Co.
Re-Fil-It Broom Mfg. Co.
Southwestern Broom Mfg. Co.

BRUSHES—MOTOR AND GENERATOR (COMMUTATOR).
Dixon Crucible Co., Jos.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

BUCKETS AND PAILS—MILL.
Standard Fibre Co.

BUCKETS—ELEVATOR AND GRAD.
Link-Belt Company.

BUCKLES—COTTON TIE.
(See Box Strapping and Ties.)

BUILDING CONTRACTORS.
(See Contractors.)

BUILDINGS (ALL STEEL).
Truscon Steel Co.

BUILDING MATERIAL.
Anchor Post Iron Works.
Barrett Co., The
Birmingham Slag Co.
Dixie Portland Cement Co.
Dufur & Co.
Hough Shade Corp.
Knapp Fence Co.
Lupton's Sons Co., David.
National Paving Brick Co.
St. Louis Surfacer & Paint Co.
Sanymetal Products Co.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.
Truscon Steel Co.
Walker Electric & Plb. Co.
Ware Paint Co.

BURR PICKERS.
Sargent's Sons, C. G.
Smith & Furbush Mach. Co.

BUSHINGS.
Dodge Sales & Eng. Co.
Southern Spindle & Flyer Co.

BUSINESS METHODS.
Ernst & Ernst.

CABINETS.
(See Lockers.)

CALCULATING MACHINES.
Monroe Calculating Mch. Co.

CALENDERS.
Butterworth & Sons Co., H. W.
Monaghan, Jas. F.
Textile Finishing Mchry. Co.

CALENDER ROLLS.
(See Rolls—Calender.)

CALLING SYSTEM—INTER-TELEPHONE.
Carter Electric Co.

CAMLESS DETACHING DEVICES.
Beiger Co.

CANS—ROVING.
National Vulcanized Fibre Co.
Standard Fibre Co.

CANS (DRYING).
(See Drying Equipment.)

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(See Trucks.)

CARBONIZING MACHINERY.
Klauder-Weldon Dyeing Machine Co.
Macomb Machine Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Sargent's Sons & Co., C. G.
Textile Finishing Mchry. Co.
Tolhurst Mch. Works.

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Howard & Bullough.
Lord Bros.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Whitin Machine Works.

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Brooks & Doxey, Ltd.
Howard & Bullough.
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Southern Spindle & Flyer Co.
Whitin Machine Works.

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Lord Bros.
Proctor & Schwartz, Inc.
Schofield Co., Wm.
Whitin Machine Co.

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Smith & Furbush Mach. Co.
Whitin Machine Works.

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Crompton & Knowles Loom Works.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Schofield, Wm., Co.
Textile Finishing Mchry. Co.

CARRIER APRONS.
(See Aprons.)

CARRIER SYSTEM.
Curtis Pneumatic Machry. Co.

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(See Boxes.)

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Cresson-Morris Co.
Lombard Fdry. & Mch. Co.
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(See Bleaching Materials.)

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Truscon Steel Co.

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Ware Paint Co.

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Georgia Railway & Power Co.
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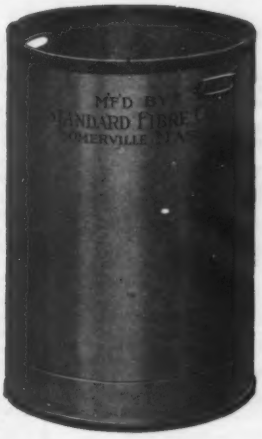

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Renold, Inc., Hans.

CHAIRS AND STOOLS.
(See Furniture—Mill.)

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Bond Co., Chas.
Hayes Loom Reed & Harness Co.
Jacobs Mfg. Co., E. H.

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(See Dyestuffs and Chemicals.)

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Electro Bleaching Gas Co.
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Murray Company, The.

CLEARER CLOTH.
Philadelphia Felt Co.

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(See Counters.)

CLOCKS (TIME).
Silberberg, Mortimer J.

CLOCKS—WATCHMAN.
Foxboro Co., Inc.

CLOSETS—WATER.
(See Toilets.)

CLOTH—ROLLER, CLEARER, SLASHER.
Philadelphia Felt Co.

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Firsching, J. A.
Foster Machine Co.
Wildman Mfg. Co.

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Gallaudet Aircraft Corp.

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Brooks & Doxey, Ltd.
Butterworth, H. W., & Sons Co.
Firsching, J. A.
Foster Machine Co.
Hopedale Mfg. Co.
Lord Bros.
Saco-Lowell Shops.
Textile Finishing Mchry. Co.
Williams Co., J. H.
Wildman Mfg. Co.

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Reliance Machine Works.
Tolhurst Mch. Wks.

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Scott Co., Henry L.

CLOTH WINDERS.
(See Winders.)

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Allis-Chalmers Mfg. Co.
Carlyle-Johnson Machine Co.
Cresson-Morris Co.
Dodge Sales & Eng. Co.
Link-Belt Company.
Mason, Volney W.
Wood's Sons Co., T. B.

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Link-Belt Company.

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(See Disinfectants.)

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(See Valves.)

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(See Buckets—Mill.)

COMB APRONS.
(See Aprons.)

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Foster Machine Co.
U. S. Bobbin & Shuttle Co.
Whitin Machine Wks.

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(See Cotton Cloth Commission Merchants.)

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Curtis Pneumatic Mchry. Co.
General Electric Co.
Goulds Mfg. Co.

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(See Brushes—Motor and Generator.)

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Birmingham Slag Co.

CONDENSERS.
Allis-Chalmers Mfg. Co.

CONDUITS.
(See Elec. Machinery & Supplies.)

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Foster Mch. Co.

CONE WINDING MACIHNE.
(See Winding Machinery.)

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Westinghouse Elec. & Mfg. Co.

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(See Architects and Engineers)

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General Electric Co.
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Taylor Instrument Co.

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(See Belt Conveyors.)

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Collins, J. D.
Cresson-Morris Co.
Curtis Pneumatic Mchry. Co.
Godfrey Conveyor Co.
Link-Belt Co.
Mason, Volney W.
Morse Chain Co.
Phila. Drying Machinery Co.
Proctor & Schwartz, Inc.
Renold, Hans.
Schofield, Wm., Co.

CONVEYORS—PORTABLE.
Link-Belt Co.

COOLERS.
(See Humidifying Apparatus.)

COOLERS—WATER.
(See Water Coolers.)

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American Blower Co.
Buckeye Blower Co.
Sturtevant Co., B. F.

COOLING TOWERS.
(See Tanks and Towers.)

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Saco-Lowell Shops.
Smith & Furbush Mach. Co.
Textile Finishing Machinery Co., The.

COST SYSTEMS.
Ernst & Ernst.

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Murray Company, The.

COTTON FANS.
(See Blowers.)

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Callaway Mills.
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Fawcett, Hughes.
Florsheim, H. A.
Hunter Mfg. & Comm. Co.
Lane & Co., J. H.
Southern Yarn Co.
Tolar & Hart.
Weimar Bros.
Wellington, Sears & Co.
Woodward, Baldwin & Co.

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Fletcher Works.
Foster Machine Co.
Foxboro Co., Inc.
Gallaudet Aircraft Corp.
Greist Mfg. Co.
Hayes Loom Reed & Harness Co.
Hopedale Mfg. Co.
Howard & Bullough.
Hunt Machine Co., Rodney.
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Lestershire Spool & Mfg. Co.
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Lowell Crayon Co.
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Schaum & Uhlinger.
Schofield Co., Wm.
Shambow Shuttle Co.
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Sturtevant Co., B. F.
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Whitin Machine Works.
Whitinsville Spinning Ring Co.

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Foster Mch Co.
Schaum & Uhlinger.

COTTON YARN MILLS.
(See Yarn Manufacturers.)

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Durant Mfg. Co.
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(See Restaurant Equipment.)

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Wood's Sons Co., T. B.

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Philadelphia Felt Co.

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(See Hoists.)

CRAYONS.
Lowell Crayon Co.

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Warp Compressing Mch. Co.

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Dixie Culvert & Metal Co.

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Jacobs & Co.

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(See Cloth Cutters.)

CUTTERS—THREAD.
(See Thread Cutters.)

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Sturtevant Co., B. F.

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(See Boxes—Packing.)

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Lupton's Sons Co., David.

DEXTRINES.
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DIAL SCALES.
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DIES—STEEL.
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DIE STOCKS.
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DISINFECTANTS.
Barrett Co., The.

DOBBY CHAINS.
Crompton & Knowles Loom Wks.
Whitin Machine Works.

DOBBY CARDS.
Jacobs Mfg. Co., E. H.

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(See Boxes—Mill.)

DOFFING CARS.
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Lupton's Sons Co., David.

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Lord Bros.
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Whitin Machine Works.

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Butterworth, H. W., & Sons Co.
Cocker Mch. & Fdry. Co.
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Proctor & Schwartz, Inc.
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Textile Finishing Machinery Co., The.
Tolhurst Machine Works.

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(See Blowers and Blowing Systems.)

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Macomb Machine Co.
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Phila. Drying Machinery Co.
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Reliance Machine Works.
Schaum & Uhlinger.
Textile Finishing Machinery Co., The.
Tolhurst Machine Works.
Woolford Wood Tank Co., G.

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(See Lamps.)

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(See Architects.)

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(See Blowers.)

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(See Brokers.)

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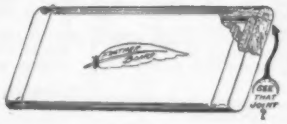

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PURIFICATION SYSTEMS
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(See Blowers and Blowing Systems.)

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(See Automatic Feeders.)

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Walsh & Weidner Boiler Co.

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(See Lubricants.)

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(See Lubricators.)

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Morse Chain Co.

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HYGROMETERS.
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(See Size Kettles.)

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(See Washers—Cloth.)

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(See Electric Lamp Guards.)

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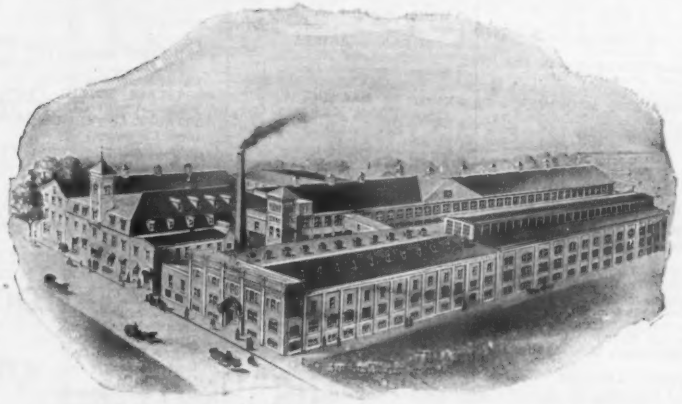

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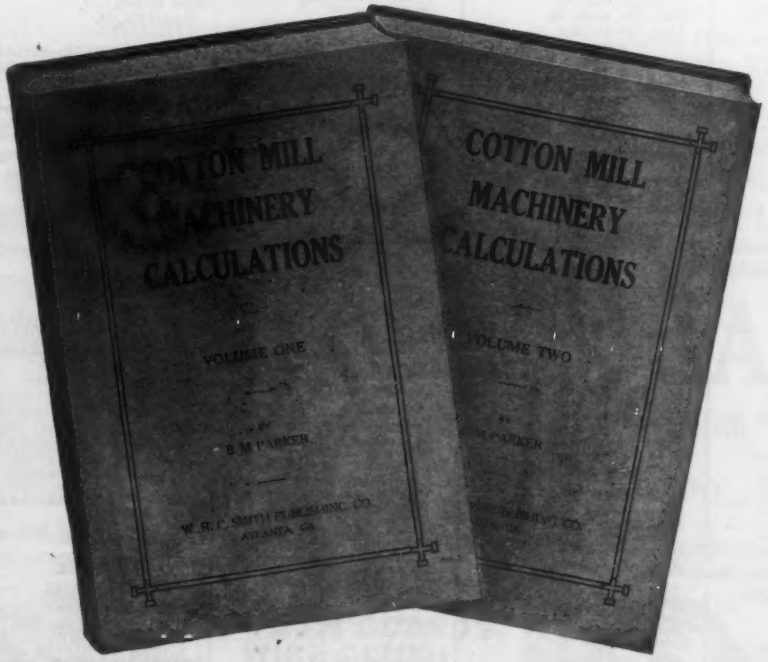

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(See Gauges.)

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(See Regulators—Pressure.)

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(See Dyers.)

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(See Blowers.)

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Lunkenheimer Co.

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(See Valve Discs.)

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Southern Railway System.

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(See Fibre Products.)

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Service Recorder Co.
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Emmons Loom Harness Co.
Hayes Loom Reed & Harness Co.

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Crompton & Knowes Loom Works.
Draper Corporation.
Gallaudet Aircraft Corporation.
Hunt Machine Co., Rodney.
Mossberg Pressed Steel Co.
Saco-Lowell Shops.
Schofield Co., Wm.
Whitin Machine Works.

REFLECTORS—LAMPS.
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REGULATORS—LIQUID LEVEL.
Foxboro Co., Inc.
General Electric Co.

REGULATORS—PRESSURE.
Bristol Co.
Foxboro Co., Inc.
General Electric Co.
Taylor Instrument Co.

REGULATORS—TEMPERATURE.
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Westinghouse Elec. & Mfg. Co.

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Briggs-Shaffner Co.
General Machine Works.
Southern Spindle & Flyer Co.
Standard Gas Products Co.

RESTAURANT EQUIPMENT.
Sanymetal Products Co.

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(See Knitting Machinery.)

RIB TOP CUTTERS.
General Machine Works.
Wildman Mfg. Co.

RING TRAVELERS—STEEL AND BRONZE.
Whitinsville Spinning Ring Co.
Whitin Machine Works.

RINGS—SPINNING.
(See Spinning Rings.)

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(See Bearings.)

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Brooks & Doxey, Ltd.
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Lord Bros.
Monaghan, Jas. F.
Textile Finishing Mchy. Co.
U. S. Bobbin & Shuttle Co.
Washburn & Sons, L. R.

ROLLS—RUBBER COVERED.
Butterworth & Sons Co., H. W.
Textile Finishing Mchy. Co.
Washburn & Sons, L. R.

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Brooks & Doxey, Ltd.
Butterworth & Sons Co., H. W.
Lord Bros.
Monaghan, Jas. F.
Southern Spindle & Flyer Co.
Textile Finishing Mchy. Co.
U. S. Bobbin & Shuttle Co.
Washburn & Sons, L. R.

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U. S. Bobbin & Shuttle Co.
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Philadelphia Felt Co.

ROLLER LEATHER.
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Cortright Metal Roofing Co.
Dixie Culvert & Metal Co.
Southern Wood Preserving Co.
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American Cement Paint Co.
Barrett & Co.
Hockaday Co.
Johnson & Co., Inc., Oliver.
Wadsworth, Howland & Co.
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Allis-Chalmers Mfg. Co.
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Link-Belt Company.

ROVING CANS.
(See Cans—Roving.)

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Howard & Bullough.
Lord Bros.
Saco-Lowell Shops.
Whitin Machine Works.

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(See Stamps, Stencils, Etc.)

SALTS.
(See Finishing & Sizing Materials.)

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Dixie Culvert & Metal Co.
Manufacturing Equip. & Eng'g Co.
Rundle-Spence Mfg. Co.
Sanymetal Products Co.
Taylor, Halsey W.
Vogel Co., Jos. A.
Walker Electric & Plbg. Co.

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Sanymetal Products Co.
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India Alkali Works.
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SEWING MACHINES.
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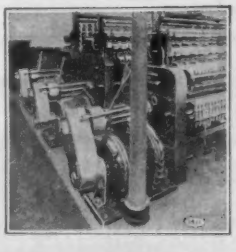

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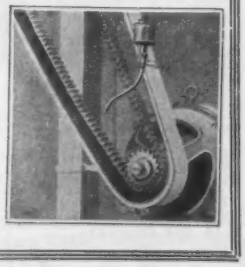

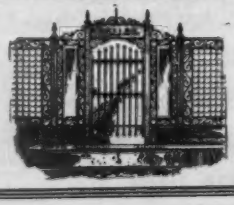

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Cortright Metal Roofing Co.

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Southern Wood Preserving Co.

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Lyon Metallic Mfg. Co.
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Walke Box Co., Inc.

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Sanymetal Products Co.

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Shambow Shuttle Co.
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(See Finishing and Sizing Materials.)

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Howard & Bullough
Moesberg Pressed Steel Corp.
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Textile Finishing Machinery Co., The.

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(See Tape—Slasher.)

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Stein, Hall & Co.
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Warren Soap Mfg. Co.
Wolf & Co., Jacques.

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(See Water Softeners.)

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Roessler & Hasslacher Chem. Co.

SOLVENTS.
(See Finishing.)

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U. S. Bobbin & Shuttle Co.
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(See Counters.)

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Whitin Machine Works.

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(See Yarn Manufacturers.)
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Philadelphia Felt Co.
Parkdale Mills, Inc.
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Lord Bros.
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Saco-Lowell Shops.
Whitin Machine Works.

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Draper Corporation.
Howard & Bullough.
Greist Mfg. Co.
Lord Bros.
Whitin Machine Works.
Whitinsville Spinning Ring Co.

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Barber Mfg. Co.

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Foster Mch. Co.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Whitin Machine Works.
Warp Compressing Mch. Co.

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Textile Specialty Co.

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U. S. Bobbin & Shuttle Co.
Vermont Spool & Bobbin Co.

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American Moistening Co.

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(See Tanks, Towers, Etc.)

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Renold, Inc., Hans.

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Gallaudet Aircraft Corporation

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Bradley Mfg. Co., A. J.

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Bosson & Lane.
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Keever Starch Co.
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Staley Co., A. E.
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Warren Soap Co.

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(See Engines—Steam.)

STEAM HOSE.
(See Hose—Fire.)

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(See Pumps—Steam.)

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(See Separators.)

STEAM TRAPS.
(See Traps—Steam.)

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Manufacturing Equip. & Eng'g Co.
Royal Metal Mfg. Co.
Sanymetal Products Co.
Truscon Steel Co.

STENCILS AND STENCIL PAPERS.
(See Stamps and Stencils.)

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(See Marking Pots and Brushes.)

STENCIL CUTTING MACHINES.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

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(See Picker Sticks.)

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(See Furniture—Mill.)

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Silberberg, Mortimer J.

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Draper Corporation.
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Whitin Machine Works.
Wildman Mfg. Co.

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Westinghouse Elec. & Mfg. Co.

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Cutter Works, George.

SULPHIDES.
(See Finishing & Sizing Materials.)

SULPHUROUS ACID GENERATOR.
Macomb Machine Co.

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Lunkenheimer Co.
Morse Chain Co.
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Rhoads & Sons, J. E.
Williams & Sons, I. B.

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Cutter Works, George.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

SWITCHBOARDS—PANEL.
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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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TABLES—MILL.
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Manufacturing Equip. & Eng'g Co.
Royal Metal Mfg. Co.
Sanymetal Products Co.

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TALLOW.
(See Finishing Machinery.)

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Lombard Iron Works.
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Lombard Iron Works.
Woolford Wood Tank Co., G.

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Godfrey Conveyor Co.
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Walsh & Weidner Boiler Co.

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Proctor & Schwartz.
Textile Finishing Mchry. Co.
Woolford Wood Tank Co., G.

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Foster Mch. Co.
Fletcher Works.
Schaum & Uhlinger.

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Barber Mfg. Co.
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(See Bandage and Tape Machinery.)

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Mates-Brown Co., B. P.
Taylor Instrument Co.

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Foxboro Co.
Mates-Brown Co., B. P.
Taylor Instrument Co.

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(See Clocks.)

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Lyon Metallic Mfg. Co.
Manufacturing Equip. & Eng'g Co.

TOOL STANDS—STEEL.
Lupton's Sons Co., David.
Lyon Metallic Mfg. Co.
Royal Metal Mfg. Co.

TOWERS.
(See Tanks—Elevated.)

TRACTORS—ELECTRIC, INDUSTRIAL.
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(See Power Transmission Machinery.)

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National Vulcanized Fibre Co.
Standard Fibre Co.

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TRUCKS—HAND AND ELEVATING.
Collins, J. D.

TRUCKS—INTER, ETC.
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Lyon Metallic Mfg. Co.
National Vulcanized Fibre Co.
Standard Fibre Co.

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(See Tanks—Wooden.)

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Westinghouse Elec. & Mfg. Co.

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American Blower Co.
General Electric Co.
Sturtevant Co., B. F.
Westinghouse Elec. & Mfg. Co.

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Buckeye Blower Co.
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Foster Mch. Co.
Howard & Bullough.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
U. S. Bobbin & Shuttle Co.
Whitin Machine Works.

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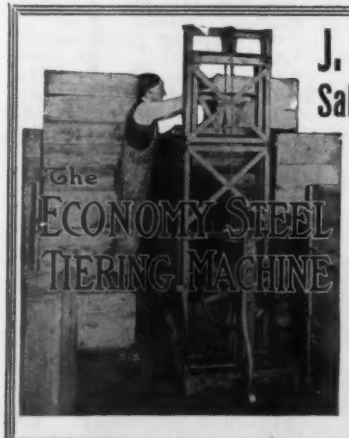

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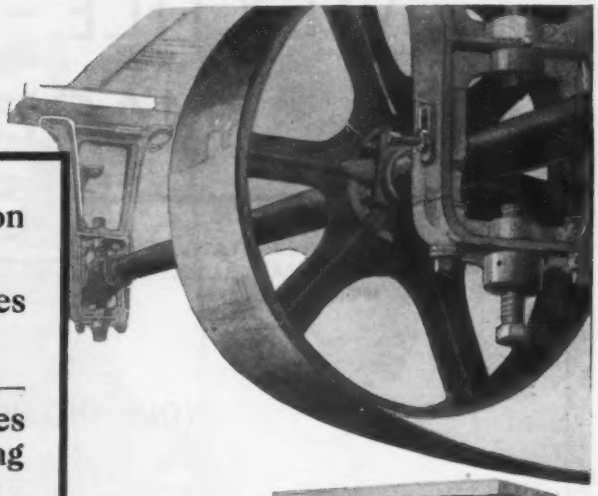

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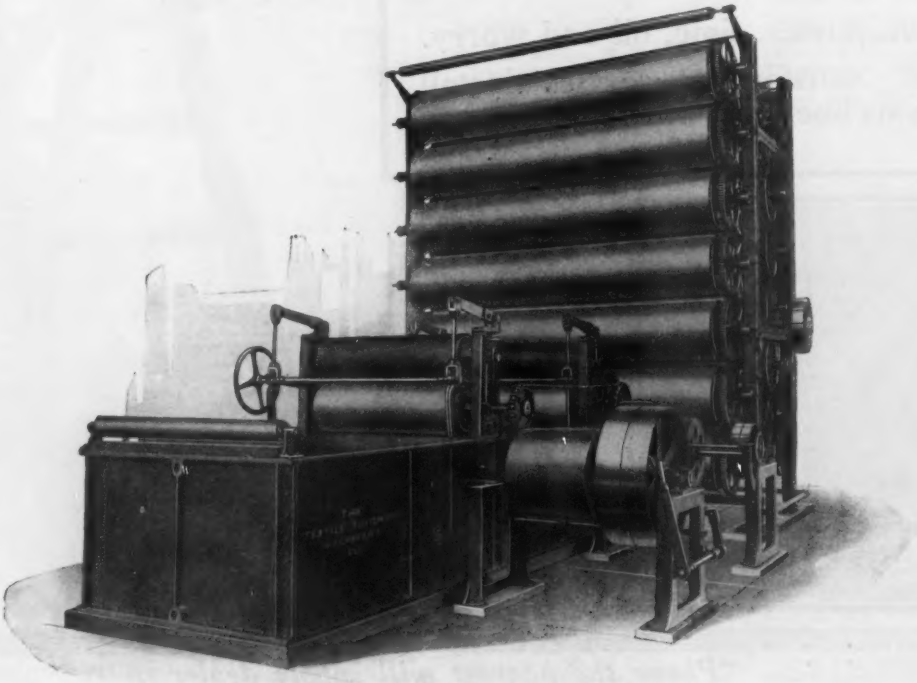

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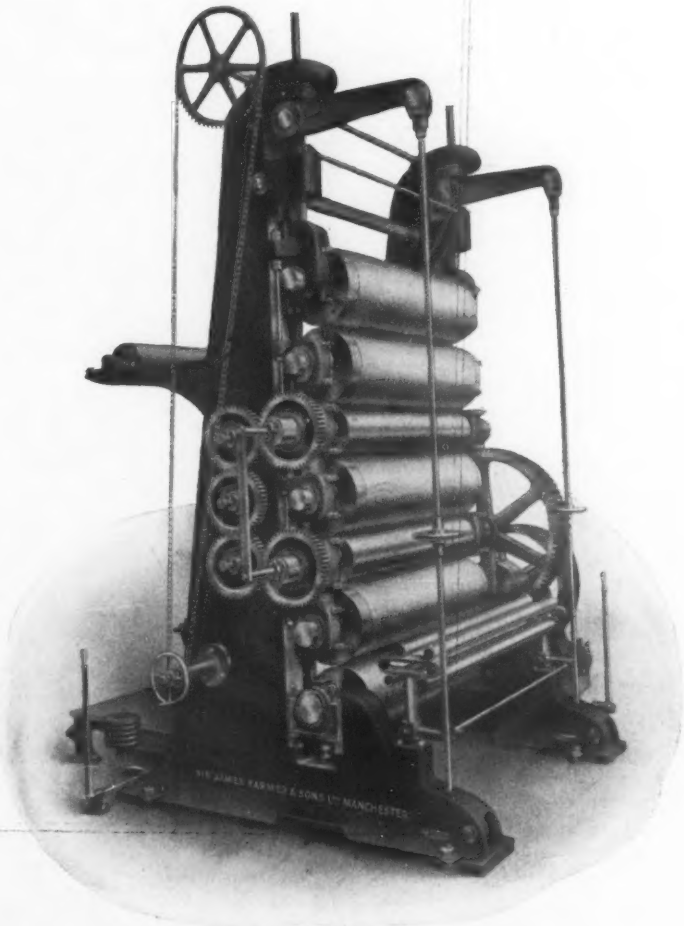

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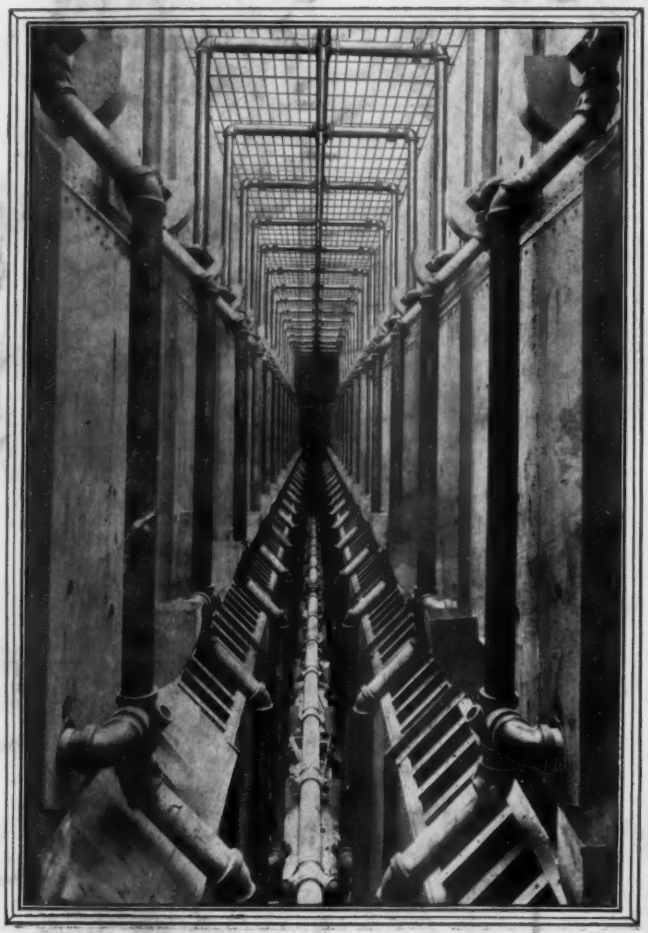

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